This course supports the assessments for EFT4. The course covers 3 competencies and represents 3 competency units.

### Introduction

#### Overview

Watch the following welcome video for an introduction to this course:

*Note: To download this video, right-click the following link and choose "Save as...": [download video]*

#### Competencies

This course provides guidance to help you demonstrate the following 3 competencies:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

- **Competency 602.4.16: Teaching Methods- Mathematics Misconceptions**
  The graduate identifies and analyzes student responses to mathematical problems to detect misunderstandings and misconceptions.

- **Competency 602.4.17: Teaching Methods- Science (Elementary)**
  The graduate provides safe, effective, research-based science instruction.

#### Teaching Dispositions Statement

Please review the [Statement of Teaching Dispositions](#).

#### Course Instructor Assistance

As you prepare to successfully demonstrate competency in this subject, remember that course instructors stand ready to help you reach your educational goals. As subject matter experts, mentors enjoy and take pride in helping students become reflective learners, problem solvers, and critical thinkers. Course instructors are excited to hear from you and eager to work with you.

Successful students report that working with a course instructor is the key to their success. Course instructors are able to share tips on approaches, tools, and skills that can help you apply the content you're studying. They also provide guidance in assessment preparation strategies and troubleshoot areas of deficiency. Even if things don't work out on your first try, course instructors act as a support system to guide you through the revision process. You should expect to work with course instructors for the duration of your coursework, and you are encouraged to contact them as soon as you begin. Course instructors are fully committed to your success!

#### Learning Resources

The learning resources listed in this section are required to complete the activities in this course. For many resources, WGU has provided automatic access through the course. However, you may need to manually enroll in or independently acquire other resources. Read the full...
instructions provided to ensure that you have access to all of your resources in a timely manner.

**Automatically Enrolled Resources**

You will be automatically enrolled at the activity level for the following learning resources. Simply click on the links provided in the activities to access the learning materials.

**VitalSource E-Texts**

The following textbooks are available to you as e-texts within this course. You will be directly linked to the specific readings required within the activities that follow.


*Note: These e-texts are available to you as part of your program tuition and fees, but you may purchase a hard copy at your own expense through VitalSource or a retailer of your choice. If you choose to do so, please use the ISBN listed to ensure that you receive the correct edition. The following sites provide instruction on how to create a VitalSource account, use features such as downloading your e-texts for offline use, and purchase a print-on-demand option, if available.*

**VitalSource Navigational Video**

**Print-On-Demand Option**

**Learning Community**

Throughout this course you are encouraged to utilize the following Learning Community to assist you in your studies:

- **STP: Math and Sciences**

The learning community provides a forum to ask general questions of your course instructors and peers.

**Sign Up for Cohorts**

You can sign up for as many or as few cohorts as you like. A cohort is designed to guide you through the material with a group of peers led by a mentor. You have daily homework emailed to you and meet with your cohort to discuss the content.

- Week 1: Section 1 Tasks 1,2,3. First week of the month.
- Week 2: Section 2 Tasks 4,5,6. Second week of the month.
- Week 3: Section 3 Tasks 7,8. Third week of the month. (Math PCE)
- Week 4: Section 4 Tasks 9,10,11. Fourth week of the month. (Science PCE)

**Cohort Schedule**

**Contact a Mentor**
Schedule and appointment with a course instructor:

Course Podcast
All of the videos you need for this course are found in the COS. If you have playback issues or you wish to use a mobile device to view the video content, you can watch the course videos on your iPhone, iPad, or iPod as a podcast. To do so click on this link while in your idevice:

http://wgu.hosted.panopto.com/Panopto/Podcast/Podcast.ashx?courseid=36930542-bcaf-4a44-823f-1e598432c33e&type=mp4

To download the videos to your computer, use the following link:

http://wgu.hosted.panopto.com/Panopto/Podcast/Podcast.ashx?courseid=36930542-bcaf-4a44-823f-1e598432c33e&type=mp4

Video Guide
Use this resource to find direct links to all available Specific Teaching Practices: Math and Sciences videos and resources:

- Video Guide

Are the videos not showing up in this COS? Click here.

Pacing Guide
The pacing guide suggests a weekly structure to pace your completion of learning activities. It is provided as a suggestion and does not represent a mandatory schedule. Follow the pacing guide carefully to complete the course in the suggested timeframe.

- Pacing Guide: Specific Teaching Practices: Math and Science

Note: This pacing guide does not replace the course. Please continue to refer to the course for a comprehensive list of the resources and activities.

Suggested Week 1

This section should take approximately 20 hours of work time to complete. The cohort will guide you through the material in one week. If you wish to participate in a cohort covering the material in this section, use the following link to sign up now.

- Sign Up for Cohorts
Questions? We are here to help!

This topic addresses the following competencies:

- Competency 602.4.15: Teaching Methods- Mathematics (Elementary)
  The graduate provides effective, research-based mathematics curriculum instruction.
- Competency 602.4.16: Teaching Methods- Mathematics Misconceptions
  The graduate identifies and analyzes student responses to mathematical problems to detect misunderstandings and misconceptions.

This topic highlights the following objectives:

- Create a lesson plan to explicitly teach counting skills to kindergarten or first grade children who enter school with few numeracy skills.
- Discuss adaptations to a mathematics lesson teaching counting skills to accommodate English Language Learners and students with exceptionalities.
- Develop an assessment to evaluate student mastery of numeracy skills.
- Describe how to teach the concept of equivalence when working with fractions with unlike denominators.
- Describe a variety of techniques for encouraging curiosity towards mathematics for students in all grades.

**Early Numeracy Skills**
At the conclusion of this sub-section you will have the competencies to complete task 602.4.15-04, 38, 39.

**Learn It: Early Numeracy Skills**
What are the early numeracy skills young students must develop?

- [Early Numeracy Skills](#) (1:42)

How will you teach and assess early counting skills? How will you accommodate the needs of English Language Learners and students with learning exceptionalities?

Read the following in *Helping Children Learn Mathematics*:

- pages 130-153 of [chapter 7 (“Developing Counting and Number Sense in Early Grades”)](#)
- page 57 of [chapter 3 (“Planning for and Teaching Diverse Learners”)](#)

**Write It: Early Numeracy Skills**

- [General Task Formatting Suggestions](#) (10:03)
Concrete and Representative Problem Solving

At the conclusion of this sub-section you will have the competencies to complete task 602.4.15-11.

Learn it: Concrete and Representative Problem Solving

What are pre-requisite skills and why is it important to consider them prior to beginning instruction on a topic?

- **Identifying Pre-requisite skills** (5:44)

What are manipulatives and how might you use them to introduce the concept of equivalent fractions?

- **Introduction to Manipulatives** (6:18)

- Find and practice using manipulatives at National Library of Virtual Manipulatives website.

Watch the following video:

- **Finding Equivalent Fractions** (4:22)

How does understanding the importance of both concrete and representative problem solving prepare you to introduce a concept like fractions?

Read the following in Helping Children Learn Mathematics:

- pages 254-272 in chapter 12 ("Fractions and Decimals: Concepts and Operations")

Watch the following video:

- **Moving from Concrete to Representative Problem Solving** (3:57)

What is concrete problem solving? How do concrete learning experiences help students develop conceptual understanding?
Read the following in *Helping Children Learn Mathematics*:

- pages 18-31 in chapter 2 ("Helping All Children Learn Mathematics with Understanding")
- pages 180-181 in chapter 9 ("Operations Meaning and Basic Facts")

What is abstract or representative problem solving? How does practicing representative problem solving help students build procedural and computational understanding?

Read the following in *Helping Children Learn Mathematics*:

- pages 27-29 in chapter 2 ("Helping All Children Learn Mathematics with Understanding")

Write it: Concrete and Representative Problem Solving

- **Overview 602.4.15-11**

**Encouraging Curiosity in Mathematics**

At the conclusion of this sub-section you will have the competencies to [complete task 602.4.15-14](#).

**Learn it: Encouraging Curiosity in Mathematics**

What strategies might you use to encourage curiosity in mathematics?

Read the following in *Helping Children Learn Mathematics*:

- pages 14-26 in chapter 2 ("Helping All Children Learn Mathematics with Understanding")

Watch the following video:

- [How Might Incorporating Manipulatives into Your Lessons Foster Student Understanding and Teach Creative Problem Solving Skills?](#) (6:18)

Write it: Encouraging Curiosity in Mathematics

- **Overview 602.4.15-14**

**Suggested Week 2**

This section should take approximately 20 hours of work time to complete. The cohort will guide you through the material in one week. If you wish to participate in a cohort covering the material in this section, use the following link to sign up now.
This topic addresses the following competencies:

- Competency 602.4.15: Teaching Methods- Mathematics (Elementary)
  The graduate provides effective, research-based mathematics curriculum instruction.
- Competency 602.4.16: Teaching Methods- Mathematics Misconceptions
  The graduate identifies and analyzes student responses to mathematical problems to
detect misunderstandings and misconceptions.

This topic highlights the following objectives:

- Explain how to teach the concept of multiplication.
- Discuss how to introduce the concept of surface area of a cube in grades 5 and 6 and
describe the prerequisite skills necessary to complete this problem.
- Describe how to teach rounding with mixed decimals to the nearest tenth and identify
the instances that would be particularly difficult.
- Describe how student error, student and teacher misconceptions, and instructional
activities are interrelated.

**Thinking Strategies and Diagnosing Errors**
At the conclusion of this sub-section you will have the competencies necessary to complete task 602.4.15-20.

**Learn it: Thinking Strategies and Diagnosing Errors**

What is the relationship between addition and multiplication?

- **Virtual Whiteboard: Addition and Multiplication** (2:34)

What principles should be considered in teaching multiplication?

- **Teaching Multiplication** (8:54)

How does understanding the commutative, associative and distributive properties help students understand the basic and advanced operations?

Read the following in *Helping Children Learn Mathematics*:

- pages 177-185 in chapter 9 (*Operations: Meaning and Basic Facts*)
Review the following website:

- Commutative, Associative and Distributive Properties

What thinking strategies do children use to solve problems?

- Childrens’ Thinking Strategies and the Properties (4:25)

Read the following in Helping Children Learn Mathematics:

- pages 192-201 in chapter 9 (“Operations: Meaning and Basic Facts”)

What is the difference between conceptual and computational errors?

- Conceptual and Computational Errors (6:09)
- Practicing Error Identification (4:35)

Select a topic from Chapter 1 on page iii and identify 2-3 conceptual errors might students make when learning basic operations?

- pages 1-37 in Math Misconceptions: From Misunderstanding to Deep Understanding

What instructional strategies can be employed to correct those errors?

- Glossary of Math Teaching Strategies

Write it: Commutative, Associative and Distributive Properties

- Overview 602.4.15-20

**Teaching and Understanding Dimensions**

At the conclusion of this sub-section you will have the competencies necessary to complete task 602.4.15-21.

**Learn it: Teaching and Understanding Dimensions**

Analyze the problem types and diagrams on the pages listed below. How does introducing a concept using concrete problem solving develop student understanding?

Read the following in Helping Children Learn Mathematics:
What prerequisite skills do students need prior to learning about three dimensional shapes and measurements?

- **Identifying Pre-Requisite Skills** (5:44)

Read the following in *Helping Children Learn Mathematics*:

- pages 367-369 in chapter 16 ("Measurement")
- Page 324, diagram 15-1 in chapter 15 ("Geometry")

Watch the following video:

- **Understanding Dimensions** (5:35)

How would you introduce the concept of surface area to a group of upper elementary students?

Read the following in *Helping Children in Mathematics*:

- pages 323-332 in chapter 15 ("Geometry")

---

**Teaching Rounding and Estimation**

At the conclusion of this sub-section you will have the competencies necessary to complete task 602.4.15-31.

**Learn it: Teaching Rounding and Estimation**

What pre-requisite skills do students need to develop before learning to round with decimals?

- **Identifying Pre-Requisite Skills** (5:44)

Read the following in *Helping Children Learn Mathematics*:

- pages 216-222 in chapter 10 ("Computation Methods: Calculators, Mental Computation, and Estimation")
• pages 272-276 in chapter 12 ("Fraction and Decimals: Concepts and Operations")

In Task 6, you will be writing an essay that prepares you to begin writing formal lesson plans. Please review this video that will help in organizing and formatting your task.

• Preparing for Lesson Planning (6:19)

How might you teach decimals to a fourth grader? What about a fifth grader?

• Virtual Whiteboard: Rounding

• Rounding Decimals Using a Number Line (3:14)

How would you check for understanding while providing instruction on rounding decimals to the tenths place? Explore the link below for some ideas:

• Techniques to Check for Understanding

What common conceptual and procedural errors might you encounter when teaching students to round decimals? How might you remedy those errors?

Read the following in Helping Children Learn Mathematics:

• pages 171-172 in chapter 8 ("Extending Number Sense: Place Value")

Watch the following video:

• Conceptual and Computational Errors (6:09)

Write it: Teaching Rounding and Estimation

• Overview 602.4.15-31

Suggested Week 3

This section should take approximately 20 hours of work time to complete. The cohort will guide you through the material in one week. If you wish to participate in a cohort covering the material in this section, use the following link to sign up now.

• Sign Up for Cohorts
Questions? We are here to help!

This topic addresses the following competencies:

- Competency 602.4.15: Teaching Methods- Mathematics (Elementary)
  The graduate provides effective, research-based mathematics curriculum instruction.
- Competency 602.4.16: Teaching Methods- Mathematics Misconceptions
  The graduate identifies and analyzes student responses to mathematical problems to detect misunderstandings and misconceptions.

This topic highlights the following objectives:

- Teach a multi-step math problem from the math curriculum using the provided mathematics teaching model.
- Provide students with opportunities to solve problems that are structurally similar to the ones previously taught.

**Teaching Multi-Step Math Problems (PCE)**
At the conclusion of this sub-section you will have the competencies necessary to complete task 602.4.15-33, 35.

**Learn it: Teaching Multi Step Math Problems**

How will you ensure that your PCE experience is successful?

- [Creating Success in PCE](#) (10:30)

Careful planning and preparation leads to success in the classroom. What are the components of an effective math lesson plan?

- [Lesson Planning](#)

To give you an idea of what is required in completing the WGU Lesson Plan template, please view this completed sample:

- [Lesson Plan Sample](#)

Watch the following video:

- [How Do You Write a Measurable Learning Objective?](#) (1:28)

Read the following in *Helping Children learn Mathematics*: 

---

---
- pages 32-59 in chapter 3 ("Planning for and Teaching Diverse Learners")

In Task 7, you will be observing and teaching a multi-step math problem. Here is a video to guide you in making arrangements for this PCE experience:

- **What Counts as Multi-Step?** (4:34)

What instructional strategies and practices will help you successfully teach multi-step math problems?

Read the following in *Helping Children Learn Mathematics*:

- pages 301-321 in chapter 14 ("Algebraic Thinking")

Why is it important to be a reflective practitioner? Consider the suggestions in this video as you complete your Guided Reflection Protocol form.

- **Guided Reflection Protocols: Advice for Success!** (3:53)

**Write it: Planning for and teaching Diverse Learners**

- **Overview 602.4.15-33, 35**

**Reflecting on Math Instruction (PCE)**

At the conclusion of this sub-section you will have the competencies necessary to complete task 602.4.16-05.

**Learn it: Reflecting on Math Instruction**

What teacher misconceptions did you observe during PCE or during other times you’ve been in a math classroom? Did those misconceptions lead to student error? How could those errors be resolved through instructional strategies?

- **Teacher Misconceptions** (2:25)

Identify one or two of the math topics you observed during PCE on pages iii and iv of the text below. Analyze common student misconceptions and errors, as they relate to that topic.

- pages 1-37 in *Math Misconceptions: From Misunderstanding to Deep Understanding*

Watch the following video:
• **Conceptual and Computational Errors** (6:09)

How can errors be corrected through instructional strategies or learning activities?

Read the following in *Helping Children Learn Mathematics*:

- pages 33-44 in chapter 3 ("Planning for and Teaching Diverse Learners")
- pages 95-97 in chapter 5 ("Mathematical Processes and Practices")
- pages 125-126 in chapter 6 ("Helping Children with Problem Solving")

Review the following website:

  • [Glossary of Math Teaching Strategies](#)

Why is it important to be a reflective practitioner?

Consider the suggestions in this video as you complete your Guided Reflection Protocol form.

  • [Guided Reflection Protocols: Advice for Success!](#) (3:53)

**Write it: Reflecting on Math Instruction**

  • [Overview 602.4.16-05](#)

**Suggested Week 4**

This section should take approximately 20 hours of work time to complete. The cohort will guide you through the material in one week. If you wish to participate in a cohort covering the material in this section, use the following link to sign up now.

  • [Sign Up for Cohorts](#)

Questions? We are here to help!

This topic addresses the following competencies:

  • Competency 602.4.17: Teaching Methods- Science (Elementary)
    The graduate provides safe, effective, research-based science instruction.

This topic highlights the following objectives:
• Plan and teach concepts of accuracy and error with regard to recording data during a science lesson.
• Lead an activity that requires students to manipulate tools, exhibits, or organic materials to learn a science concept.
• Discuss how science can be used to help make informed decisions about global/societal issues.

Accuracy and Error in Data Collection (PCE)
At the conclusion of this sub-section you will have the competencies necessary to complete task 602.4.17-07.

Learn it: Accuracy and Error in Data Collection

How will you ensure that your PCE experience is successful?

  • Creating Success in PCE (10:30)

Careful planning and preparation leads to success in the classroom. What are the components of an effective math lesson plan?

  • Lesson Planning

To give you an idea of what is required in completing the WGU Lesson Plan template, please view this completed sample:

  • Lesson Plan Sample

Watch the following video:

  • How Do You Write a Measureable Learning Objective? (1:28)

The inquiry method is one pedagogical strategy for delivering instruction. What makes it particularly effective for teaching science? What other pedagogical strategies might be effective in a science classroom?

  • The Inquiry Method: An Introduction for New Teachers (11:24)

What questioning strategies will you employ as students participate in scientific exploration?

Read the following in Science Stories: Science Methods for Elementary and Middle School Teachers:

  • pages 293-297 in chapter 11 ("Planning for Science: Lesson Plans and Instructional Strategies")
Read the following in *Science Stories: Science Methods for Elementary and Middle School Teachers*:

- pages 286-291 in chapter 11 ("Planning for Science: Lesson Plans and Instructional Strategies")

Analyze the following diagram in *Science Stories: Science Methods for Elementary and Middle School Teachers*. How will you teach scientific process skills during your instruction?

- Page 106, Table 1.2 in chapter 4 ("Locating Your Scientific Self: Using the Skills of Scientific Study")

It is important that young science students understand accuracy and error during data collection. How might you introduce these concepts as part of the curriculum you are teaching?

- [Accuracy and Error in Data Collection](#) (9:17)
- [Teaching Ideas for Accuracy and Error](#) (8:24)

Why is it important to be a reflective practitioner? Consider the suggestions in this video as you complete your Guided Reflection Protocol form.

- [Guided Reflection Protocols: Advice for Success!](#) (3:53)

**Write it: Accuracy and Error in Data Collection**

- [General task formatting suggestions](#) (10:03)

**Conducting Science Activities (PCE)**

At the conclusion of this sub-section you will have the competencies necessary to complete task 10 (602.4.17-15).

**Learn it: Conducting Science Activities**

How will you ensure the safety of your students during science activities? As a teacher, you have an obligation to prevent children from being injured in the classroom. What are the ramifications that could result from neglecting student safety?
- pages 1-9 in *Safety in the Elementary (K-6) Science Classroom*
- *Legal Aspects of Laboratory Safety*

Watch the following video:

- *How Do You Write a Measurable Learning Objective?* (1:28)

Please scan the chapter titles in part 2 of your *Science Stories: Science Methods for Elementary and Middle School Teachers* text for topics, ideas and activities to implement during your PCE science activity.

- pages 63-263 in *Part 2 ("Doing Science with Students Inquiry in Practice")*
- page 63 in *chapter 3 ("The Teacher as Mediator and Facilitator of Student Learning")*

What elements must be present for a meaningful hands-on science activity?

Read the following in *Science Stories: Science Methods for Elementary and Middle School Teachers*:

- pages 15-17 in *chapter 1 ("An Invitation to Teaching Science")*

Why is it important to be a reflective practitioner?

Consider the suggestions in this video as you complete your Guided Reflection Protocol form.

- *Guided Reflection Protocols: Advice for Success!* (3:53)

**Write it: Conducting Science Activities**

- *Overview 602.4.17-15*

**Using Scientific Knowledge to Make Decisions**

At the conclusion of this sub-section you will have the competencies necessary to complete task 602.4.17-10.

**Learn it: Using Scientific Knowledge to make Decisions**

How can you use the WGU Library to conduct research on a scientific topic?

- *Using the Federated Search*

- *Using the E-brary E-book Collection*
How does scientific knowledge inform your opinions?

Read the following in *Science Stories: Science Methods for Elementary and Middle School Teachers*:

- pages 37-49 in *chapter 2 ("Locating Your Scientific Self")*

Use the WGU Library to conduct your research as you complete Task 602.4.17-10.

- [The WGU Library](#)

**Write it: Using Scientific Knowledge to make Decisions**

- [Overview 602.4.17-10](#)

**Final Steps**

Congratulations on completing the activities in this course! This course has prepared you to complete the assessment associated with this course. If you have not already been directed to complete it, schedule and complete the assessment now.