

## Title

Shaping Up: Teaching Geometry Using Technology in Grades 3–5

## Target Audience

This course is intended for grades 3-5 pre-service and in-service teachers.

## Course Description

This course is designed to bring learners up to date on the most effective ways to teach geometry to students in grades 3-5. After presenting the latest recommendations from the National Council of Teachers of Mathematics (NCTM), the course focuses on some sample geometry lessons created by math experts. Learners will discover how to take advantage of the Internet and computer software applications to provide students with a rich learning environment. Learners will spend time reflecting on how to integrate the NCTM standards for teaching geometry into unit planning, collaborating online with other learners to gain insight from various personal professional experiences. Software and Web-based interactive activities allow learners to generate resources for students to use as they explore geometry concepts. Additional Internet resources give learners even more opportunities to enhance their students' knowledge of geometry. By the end of this course, learners will be able to immediately combine knowledge of NCTM standards and unit planning with computer technology to create and field-test a geometry mini-unit for math students in grades 3-5.

## Instructor / Facilitator

See instructor/facilitator sheet

## Credits

TBA

## Objectives

Learners will:

- Integrate the NCTM standards for teaching geometry into unit planning
- Use knowledge of lesson planning to explore, evaluate, and connect geometry and technology into a mini-unit
- Use software and Web-based interactive activities to generate resources for students to use as they explore geometry concepts
- Use Internet resources to enhance students' knowledge of geometry concepts
- Apply knowledge of NCTM standards and unit planning in the creation and field-testing of a mini-unit that integrates technology into the teaching of geometry

## Outline of Content and Assignments

A summary of course content and assignments is outlined below. Details for each assignment, including locations of readings and complementary Web resources, are included in each part of the Course Content.

Part 1: Review the NCTM Standards for Teaching Mathematics

Learners will:

Read

- Introduction, *Standards for Teaching Mathematics: The Teacher's Role in Discourse*
- "What Is a Tessellation?"

Review exemplary lesson plan design

- "How to Develop a Lesson Plan"
- *AskERIC* Curriculum Materials

Review lesson plans

- Sidewalk Capers
- Mirror, Mirror

View videos of lesson plans implemented in classroom

- "Sidewalk Capers" Part 1
- "Sidewalk Capers" Part 2
- "Mirror, Mirror"

Participate in the online discussion

Upon completion of the readings and assignments, learners will reflect on the NCTM National Standards for Teaching Mathematics (Part 1).

In a discussion board forum, learners will explain how to apply a lesson and provide at least one modification, based on NCTM standards. Learners will also share their preferred site and provide supporting comments. After posting responses, learners will follow the Discussion Board to reflect upon classmate observations.

Maintain an online journal

Learners will record thoughts and reactions as indicated in course content.

Part 2: Use Software to Explore Concepts in Geometry

Learners will:

Read

- "Geometry Standard for Grades 3–5," *Principles and Standards for School Mathematics*
- "The Technology Principle"

Review suggestions for software and computer activity selection

- "Evaluating Technology-Based Curriculum Materials"
- "Seven Steps to Responsible Software Selection"

Explore computer activities (included in the course)

- Exploring Geometric Solids and Their Properties
- Floor Tiles
- Tessellate!
- Tenth Planet Explores Math-Multimedia activity sample
- Tessellation Tutorials
- Word processing or drawing software

Participate in online discussion:

Upon completion of the readings and assignments, learners will reflect on Using Software in the Classroom (Part 2).

Learners will review lessons about teaching geometry and apply them to a computer-based activity. Learners will also choose one of the computer-based activities in Part 2 and explain how they would present it to students. Learners will then be asked to determine questions to stimulate students' thinking about geometry. Finally, learners will interact on the Discussion Board to read and comment on classmate opinions.

Maintain an online journal

Learners will record thoughts and reactions in the online journal as indicated in the "Think About It" section and as directed by the facilitator.

## Part 3: Use the Web to Connect with Geometry

Learners will:

Read

- "Connections Standard for Grades 3–5"

Review suggestions for evaluating Internet-based resources

- "Guidelines for Evaluating Web Sites"

Review activity

- Community Geometry

Explore Internet-based activities and resources

- "Exploring Connections between Mathematics and Art"
- Math Arena: Quilt Reflect

Participate in the online discussion

Upon completion of the readings and assignments, learners will reflect on Using Internet Resources in the Classroom (Part 3). Learners will discuss and post general feelings, potential problems, and solutions on introducing Internet activities in the classroom. They will also check the Discussion Board to read and provide feedback on classmate opinions.

Maintain online journal

Learners will record thoughts and reactions in the online journal as indicated in the "Think About It" section and as directed by the facilitator.

## Part 4: Use the Web to Locate Curriculum Ideas

Learners will:

Review suggestions for evaluating and assessing Internet resources

- Assessment & Rubric Information
- "Evaluating Online Educational Materials for Use in Instruction"

Review and evaluate Internet resources

- Illuminations
- Elementary School Teachers' Place: 3rd-5th grades, The Math Forum
- The Gateway to Educational Materials
- PBS Teacher Source: Math
- Public Discussions, The Math Forum
- Math Central
- Ask Dr. Math
- Quandaries and Queries, Math Central
- Educator's Reference Desk

Participate in the online discussion



After completing the readings and assignments, learners will reflect on The Best Web Resources (Part 4).

Learners will be asked to think about units they currently teach or will teach and consider the following questions: What sites or resources might be particularly useful for the teacher and for the students? What criteria did you use to come to your conclusions? Identify the unit(s) and the site(s) for each purpose.

Learners will be directed to check the Discussion Board to read and comment on what classmates have written.

Maintain an online journal

Learners will record thoughts and reactions as indicated in the "Think About It" section and as directed by the facilitator.

### Final Assignment

#### **Develop Curriculum Units**

In the course of this online course, learners will learn the NCTM National Standards for teaching geometry, watch experienced teachers in action, review Web resources, think of ways to integrate technology and teaching, and discuss ideas with other participants. The learner's final assignment will give the opportunity to use this newly acquired knowledge in the classroom.

**The learner will choose one of the following assignments and use the Digital Drop Box in the Student Tools area of the course to submit to the facilitator.**

1. Choose three lesson plans that were presented in this course and try them with your students. If you choose a lesson plan that does not have a technology component, think of a way that you can integrate technology and incorporate it into the lesson. Then, write a short paper (totaling 3–5 pages) that discusses your experiences with all of the lessons that you chose. For example, discuss what worked well. Provide at least two ways you would change the lesson plans the next time you teach them and provide the criteria/bases for these improvements. Discuss the strengths and weaknesses of the use of technology in the lesson. Be sure to discuss the reasoning behind your statements and their basis in concepts you explored in this course. What would you do differently if you taught these lessons again? Submit your paper to your facilitator using the Digital Drop Box in the Student Tools area of the course.

OR

2. Search the Internet and find three geometry lesson plans that you would like to use with your students. Make sure that they all include a technology component, such as a computer-based activity or a Web connection. Try the lessons with your students. Then, write a short paper (totaling 3–5 pages) that discusses your experiences with all of the lessons that you chose. For example, discuss what criteria you used to choose your lessons. Provide at least two changes you would make to improve the lesson plans. Be sure to provide the criteria you used for the changes you suggested and their basis in concepts you explored in this course. What would you do differently if you taught these lessons again? Submit your paper to your facilitator using the Digital Drop Box in the Student Tools area of the course.

OR

3. Create your own geometry mini-unit (three or four lesson plans) with a technology component. To get ideas for your lesson plans, you can use the resources in this course or go to <http://www.pbs.org/teachersource/mathline/concepts/moremathconcepts.shtm>. Write up your lesson plans, including headings such as Objectives (what students should know and/or be able to do at the end of the lesson), Assessments (What evidence will indicate that students have

mastered the concepts? Be sure you create and include assessments), Overview (summary of the lesson), Materials needed, Procedure, and Extensions (activities for students who need enrichment or extra practice). Try out your mini-unit with your students. Write a one page paper describing how it worked and what you would do to improve the unit. Include a discussion of the criteria you used for your suggested improvements. Submit your paper and lesson plan to your facilitator using the Digital Drop Box in the Student Tools area of the course.

Reflecting on the Final Project

Talk about it

What did you learn as you completed your final assignment? Did you find some great new resources on the Internet? Did you have some interesting geometry experiences in the classroom? Go to the Discussion Board and type your answers. If you want, you can copy your final project into your message for other participants to see. Check the Discussion Board to find out and comment on what classmates have written. Comment on at least two classmates' final projects.

Record thoughts and reactions in the online journal as indicated in the content sections of the course.

**Schedule**

This course is scheduled to take approximately 15-20 hours to complete readings, activities, video, assignments, reflections and a final project.

**Requirements**

Learners are expected to

- Complete all assignments
- Participate in discussion boards
- Maintain an online journal

**Evaluation**

Pass/fail upon satisfactory assignment completion, full discussion board participation, and consistent online journal entries.

**Materials (hardware, software, plug-ins)**

Technical Requirements

- Word processor
- Internet service provider
- Email

**Academic Dishonesty Policy**

To be inserted by university institution only