

STEM-910 – Teaching with Tinkercad

Independent Study Online Course Syllabus

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Number of Graduate Semester Units: 3
Target Audience: Any Educator
Course Access: <https://connect.fresno.edu>
YouTube Channel: [MrWestland](https://www.youtube.com/channel/UCMrWestland)

Course Description

Tinkercad is an amazingly easy-to-use, powerful program for creating 3D digital designs that are ready to be 3D printed, incorporated into projects or solve design challenges. This FREE collection of online software tools help people all over the world think, create, make and Tinker! For teachers, it integrates easily with Google/Tinkercad Classroom and is 100% cloud-based, meaning it will operate on any device that can run a web browser, including Chromebooks and iPads.

From the moment you open its welcoming interface, Tinkercad will draw you into the world of 3D modeling one basic shape at a time. All of the instruction is online, there are no extra materials to purchase. Students of all ages love Tinkercad. Discover and learn you can energize your instruction with Tinkercad.

Note: There is no required book for this course.

Recommended Texts and Course Materials

Readings: All of the readings will be included in the course.

Online Resources: Relevant online resources that support the course content and encourage further investigation will be available throughout the course assignments. Active hyperlinks are utilized throughout the course and will link to the appropriate information when clicked. These include videos, podcasts, worksheets, online activities, journal articles and other resources.

Canvas: This course will be delivered totally online. Canvas is a web-based learning management system (LMS) that provides students access to online resources, documents, videos, assignments, quizzes, forums, etc. Canvas is easy to learn and has a user-friendly interface.

Course Dates

Self-paced; students may enroll at any time and take up to one year, from the date of registration, to complete assignments. Students may complete assignments in no less than three weeks (one week per credit), to complete the course.

National Standards Addressed in This Course

National Board for Professional Teaching Standards (NBPTS)

1. Teachers are committed to students and their learning.
2. Teachers know the subjects they teach and how to teach those subjects to students.
3. Teachers are responsible for managing and monitoring student learning.
4. Teachers think systematically about their practice and learn from experience.
5. Teachers are members of learning communities.

McRel Technology Standards

1. Knows the characteristics and uses of computer hardware and operating systems
2. Knows the characteristics and uses of computer software programs
3. Understands the relationships among science, technology, society, and the individual
4. Understands the nature of technological design
5. Understands the nature and operation of systems.
6. Understands the nature and uses of different forms of technology

ISTE Standards for Educators

1. Learner

Educators continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning. Educators:

- a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.
- b. Pursue professional interests by creating and actively participating in local and global learning networks.
- c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.

2. Leader

Educators seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning. Educators:

- a. Shape, advance and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.
- b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.
- c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

3. Citizen

Educators inspire students to positively contribute to and responsibly participate in the digital world.

Educators:

- a. Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.
- b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.
- c. Mentor students in the safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.
- d. Model and promote management of personal data and digital identity and protect student data privacy.

4. Collaborator

Educators dedicate time to collaborate with both colleagues and students to improve practice, discover

and share resources and ideas, and solve problems. Educators:

- a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.
- b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.
- c. Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.
- d. Demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning.

5. Designer

Educators design authentic, learner-driven activities and environments that recognize and accommodate learner variability. Educators:

- a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
- b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
- c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

6. Facilitator

Educators facilitate learning with technology to support student achievement of the 2016 ISTE Standards for Students. Educators:

- a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
- b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
- c. Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.
- d. Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.

7. Analyst

Educators understand and use data to drive their instruction and support students in achieving their learning goals. Educators:

- a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.
- b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.
- c. Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self-direction.

Continuing Education Program Student Learning Outcomes

CE 1	Demonstrate proficient written communication by articulating a clear focus, synthesizing arguments, and utilizing standard formats in order to inform and persuade others, and present information applicable to targeted use.
CE 2	Demonstrate comprehension of content-specific knowledge and the ability to apply it in theoretical, personal, professional, or societal contexts.
CE 3	Reflect on their personal and professional growth and provide evidence of how such reflection is utilized to manage personal and professional improvement.

CE 4	Apply critical thinking competencies by generating probing questions, recognizing underlying assumptions, interpreting and evaluating relevant information, and applying their understandings to the professional setting.
CE 5	Reflect on values that inspire high standards of professional and ethical behavior as they pursue excellence in applying new learning to their chosen field.
CE 6	Identify information needed in order to fully understand a topic or task, organize that information, identify the best sources of information for a given enquiry, locate and critically evaluate sources, and accurately and effectively share that information.

Student Learning Outcomes (SLOs) for This Course

Student Learning Outcomes for This Course By the end of this course student will be able to:	National Standards Addressed in This Course*	Continuing Education Program Student Learning Outcomes Addressed**
1. Explore and implement the use of 3D modeling in their instruction with Tinkercad.	(NBPTS 1,2,4,5) (ISTE-T 1,2,4,6) (McRel Tech 2,4,6)	CE 2, 5, 6
2. Discover and utilize the vast number of Tinkercad resources available in the education sharing community.	(NBPTS 1,2,5) (ISTE-T 1,2,3,6) (McRel Tech 4,6)	CE 2, 4, 6
3. Develop classroom tools and collaborative support for implementing Tinkercad in STEM lessons.	(NBPTS 1,2,3,4) (ISTE-T 2,3,4,5) (McRel Tech 3,4,6)	CE 1, 5
4. Create new and modify existing Tinkercad models to integrate into their instruction.	(NBPTS 2,4) (ISTE-T 2,3,4,5,6) (McRel Tech 3,4,6)	CE 2, 4, 6
5. Demonstrate effective use of tools, resources, and pedagogies that support implementation of Tinkercad modeling activities in the classroom.	(NBPTS 1,2,3,4,5) (ISTE-T 2,3,4,5,6) (McRel Tech 3,4,6)	CE 2, 4, 5, 6
6. Complete an educational plan to match academic goals.	(NBPTS 1,2,3,4,5) (ISTE-T 5, 6) (McRel Tech 3, 4, 6)	CE 1, 2, 4, 6

* Please refer to the section on **National Standards Addressed in This Course**

** Please refer to the section on **Continuing Education Program Student Learning Outcomes**

Topics, Assignments, and Activities

Module Title	Module Assignments and Activities	Points Possible For Each Assignment
Begin Here	<ul style="list-style-type: none"> • Course introduction video • Introduce yourself forum • Moodle online tutorial • Course syllabus 	
Module 1 – The Value of 3D Modeling Across the Curriculum	<ul style="list-style-type: none"> • Topics related integrating 3D modeling across the curriculum. • Reading: Selected online reading • Watch: Self-paced video screencasts related to topics from this module along with a variety of supplemental video tutorials. • 1.1 Forum participation – How you hope to incorporate Tinkercad in your classroom. • 1.2 Assignment – Lesson plan where Tinkercad could be incorporated. 	<p>5 Points</p> <p>5 Points</p>
Module 2 – Creating A Tinkercad Classroom	<ul style="list-style-type: none"> • Topics related to developing a successful 3D program that uses Tinkercad as one of its components. • Reading: Selected online reading • Watch: Self-paced video screencasts related to topics from this module along with a variety of supplemental video tutorials. • 2.1 Assignment: Setting Up a Classroom via Tinkercad Classrooms or Google Classroom. • 2.2 Assignment: Finding Models To Use With Tinkercad. 	<p>5 Points</p> <p>5 Points</p>
Module 3 – Navigation and Menus	<ul style="list-style-type: none"> • Topics related to Tinkercad’s interface. • Watch: Screencasts and tutorials related to understanding the best hardware settings for a specific application. • Reading Selected online reading. • 3.1 Assignment: The Tinkercad Interface. • 3.2 Assignment: File management. 	<p>5 Points</p> <p>5 Points</p>

Module 4 – Making and Manipulating Grouped Objects	<ul style="list-style-type: none"> • Topics related editing primary shapes with Tinkercad. • Reading: Selected online reading. • Watch: Self-paced video screencasts related to topics from this module along with a variety of supplemental video tutorials. • 4.1 Assignment: Shape Manipulation, Rotation and Scaling. • 4.2 Assignment: Group, Hole, Align, and Flip Tools. • 4.3 Assignment: Workplane, Ruler, Blocks and Bricks. • 4.4 Assignment – Circular Patterns, Linear Patterns, and Slicing of Objects. 	<p>5 Points</p> <p>5 Points</p> <p>5 Points</p> <p>5 Points</p>
Module 5 – 3D Modeling Assignments	<ul style="list-style-type: none"> • Topics related to actual 3D modeling projects. • Reading: Selected online reading. • Watch: Self-paced video screencasts related to topics from this module along with a variety of supplemental video tutorials. • 5.1 Assignment: Modeling a combination wrench. • 5.2 Assignment: Modeling The Lego Man. • 5.3 Assignment: Modeling a Toy Locomotive. • 5.4 Assignment: Advanced Tinkercad Shapes. 	<p>10 Points</p> <p>10 Points</p> <p>10 Points</p> <p>5 Points</p>
Module 6 – Independent Project: Tinkercad In Your Classroom	<ul style="list-style-type: none"> • Topics related to a complete Tinkercad instructional unit. • 6.1 Assignment: Independent Project 	<p>15 Points</p>
Module 7 – Finishing Up	<ul style="list-style-type: none"> • Reading: Instructions on class completion, including feedback, course review and grade request. • Watch: Course completion video. 	<p>Included above</p>
TOTAL POINTS		100

Grading Policies, Rubrics, and Requirements for Assignments

Grading Policies

- Assignments will be graded per criteria presented in the course rubrics.
- A = 90-100% and B = 80-89%, (anything below 80% will not receive credit.)
- The discernment between an A or a B letter grade is at the discretion of the instructor based on the quality of work submitted (see course rubrics).
- Coursework falling below a B grade will be returned with further instructions.
- All assignments must be completed to receive a grade and are expected to reflect the quality that teacher-training institutions require of professional educators. If completed assignments do not meet this standard, students will be notified with further instructions from the instructor.

Grading Rubrics

Grade	Percent	Description	Rubric
A	90-100%	Excellent	Meets all course / assignment requirements with significant evidence of subject mastery and demonstration of excellent graduate level professional development scholarship.
B	80-89%	Very Good	Adequately meets criteria for all course/assignment requirements - demonstrates subject competency with very good graduate level professional development scholarship.
NC	Below 80%	Unacceptable	Does not meet the minimum criteria for all course/assignment requirements and demonstrated little, if any, evidence of acceptable graduate level professional development scholarship.

Writing Requirements

- **Superior:** Writing is clear, succinct, and reflects graduate level expectations. Clearly addresses all parts of the writing task. Maintains a consistent point of view and organizational structure. Include relevant facts, details, and explanations.
- **Standard:** Writing is acceptable with very few mistakes in grammar and spelling. Addresses most parts of the writing task. Maintains a mostly consistent point of view and organizational structure. Include mostly relevant facts, details, and explanations.
- **Sub-standard:** Writing contains noticeable mistakes in grammar and spelling. Does not address all parts of the writing task. Lacks a consistent point of view and organization structure. May include marginally relevant facts, details, and explanations.

Lesson Plan Requirements

- **Superior:** Instructional goals and objectives clearly stated. Instructional strategies appropriate for learning outcome(s). Method for assessing student learning and evaluating instruction is clearly delineated and authentic. All materials necessary for student and teacher to complete lesson clearly listed.
- **Standard:** Instructional goals and objectives are stated but are not easy to understand. Some instructional strategies are appropriate for learning outcome(s). Method for assessing student learning and evaluating instruction is present. Most materials necessary for student and teacher to complete lesson are listed.
- **Sub-standard:** Instructional goals and objectives are not stated. Learners cannot tell what is expected of them. Instructional strategies are missing or strategies used are inappropriate. Method for assessing student learning and evaluating instruction is missing. Materials necessary for student and teacher to complete lesson are missing.

Forum Requirements

- **Superior:** Response was at least 1 page (3 fully developed paragraphs) in length. Thoroughly answered all the posed questions, followed all the assignment directions, proper grammar and no spelling errors. Language is clear, concise, and easy to understand. Uses terminology appropriately and is logically organized.
- **Standard:** Response was ½ to 1 page in length (2-3 fully developed paragraphs). Answered all the questions but did not provide an in-depth analysis, followed most of the assignment directions, proper grammar and no spelling errors. Language is comprehensible, but there a few passages that are difficult to understand. The organization is generally good.

- **Sub-standard:** Response was less than ½ page in length (1 paragraph). Did not answer all the required questions and/or statements or responses were superficial, vague, or unclear, did not follow the assignment directions, many grammar and spelling errors. Is adequately written, but may use some terms incorrectly; may need to be read two or more times to be understood.

Instructor/Student Contact Information

Throughout the course participants will be communicating with the instructor and their classmates on a regular basis using asynchronous discussion forums. A virtual office is utilized for class questions and students are provided with instructor contact information in the event they want to make email or phone contact. In addition, students are encouraged to email or phone the instructor at any time. Students will also receive feedback on the required assignments as they are submitted.

Forums

Participation is an important expectation of this course and all online courses. Online discussions promote reflection and analysis while allowing students to appreciate and evaluate positions that others express. While students may not be engaging with the same students throughout this course they will be expected to offer comments, questions, and replies to the discussion question whenever possible. The faculty role in the discussion forum is that of an observer and facilitator.

Coursework Hours

Based on the Carnegie Unit standard, a unit of graduate credit measures academic credit based on the number of hours the student is engaged in learning. This includes all time spent on the course: reading the textbook, watching videos, listening to audio lessons, researching topics, writing papers, creating projects, developing lesson plans, posting to discussion boards, etc. Coursework offered for FPU Continuing Education graduate credit adheres to 45 hours per semester unit for the 900-level courses. Therefore, a student will spend approximately 90 hours on a typical 2-unit course or 135 hours on a typical 3-unit course.

Services for Students with Disabilities

Students with disabilities are eligible for reasonable accommodations in their academic work in all classes. In order to receive assistance, the student with a disability must provide the Academic Support Center with documentation, which describes the specific disability. The documentation must be from a qualified professional in the area of the disability (i.e. psychologist, physician or educational diagnostician). Once documentation is on file, arrangements for reasonable accommodations can be made. For more information and for downloadable forms, please go to <https://www.fresno.edu/departments/disability-access-education>.

Plagiarism and Academic Honesty

All people participating in the educational process at Fresno Pacific University are expected to pursue honesty and integrity in all aspects of their academic work. Academic dishonesty, including plagiarism, will be handled per the procedures set forth in the Fresno Pacific University Catalogue - <https://www.fresno.edu/students/registrars-office/academic-catalogs>

Technology Requirements

To successfully complete the course requirements, course participants will need Internet access, can send and receive email, know how to manage simple files in a word processing program, and

have a basic understanding of the Internet. Please remember that the instructor is not able to offer technical support. If you need technical support, please contact your Internet Service Provider.

Getting Help with Canvas: If you need help with Canvas, please contact the FPU Help Desk by phone: (559) 453-3410 or email: helpdesk@fresno.edu. Help is available Mon-Fri 8:00 am to 7:00 pm.

Final Course Grade and Transcripts

When all work for the course has been completed, students will need to logon to the Continuing Education website (<https://ce.fresno.edu/my-account>) and “Request Final Grade”. Once the instructor receives the requests and submits the grade online, students may log back in to view their Final Grade Report or order transcripts online. Please allow at least two weeks for the final grade to be posted. For more information, see the Continuing Education Policies and Procedures at <https://ce.fresno.edu/ce-policies-and-procedures>.

University Policies and Procedures

Students are responsible for becoming familiar with the information presented in the Academic Catalog and for knowing and observing all policies and procedures related to their participation in the university community. A summary of university policies may be found on the university website at <https://www.fresno.edu/departments/registrars-office/academic-catalogs>.

Fresno Pacific University Student Learning Outcomes

Student Learning Outcomes Oral Communication: Students will <i>exhibit</i> clear, engaging, and confident oral communication – in both individual and group settings – and will critically <i>evaluate</i> content and delivery components.
Written Communication: Students will <i>demonstrate</i> proficient written communication by <i>articulating</i> a clear focus, <i>synthesizing</i> arguments, and utilizing standard formats in order to <i>inform</i> and <i>persuade</i> others.
Content Knowledge: Students will <i>demonstrate</i> comprehension of content-specific knowledge and the ability to apply it in theoretical, personal, professional, or societal contexts.
Reflection: Students will <i>reflect</i> on their personal and professional growth and <i>provide evidence</i> of how such reflection is utilized to manage personal and vocational improvement.
Critical Thinking: Students will <i>apply</i> critical thinking competencies by <i>generating</i> probing questions, <i>recognizing</i> underlying assumptions, <i>interpreting</i> and <i>evaluating</i> relevant information, and <i>applying</i> their understandings to new situations.
Moral Reasoning: Students will <i>identify</i> and <i>apply</i> moral reasoning and ethical decision-making skills, and <i>articulate</i> the norms and principles underlying a Christian world-view.
Service: Students will <i>demonstrate</i> service and reconciliation as a way of leadership.
Cultural and Global Perspective: Students will <i>identify</i> personal, cultural, and global perspectives and will employ these perspectives to <i>evaluate</i> complex systems.
Quantitative Reasoning: Students will accurately <i>compute</i> calculations and symbolic operations and <i>explain</i> their use in a field of study.
Information Literacy: Students will <i>identify</i> information needed in order to fully understand a topic or task, <i>explain</i> how that information is organized, <i>identify</i> the best sources of information for a given enquiry, <i>locate</i> and critically <i>evaluate</i> sources, and accurately and effectively <i>share</i> that information.