

STEM-906 - Teaching with Scratch

Independent Study Online Course Syllabus

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Number of Graduate Semester Units: 3

Target Audience: PK-12 educators

Course Access: <https://connect.fresno.edu>

Course Description

Scratch is a free, easy-to-learn computer programming platform that enables users of all ages and abilities to design creative projects. Using brightly colored drag-and-drop blocks, Scratchers can construct games, animate stories, illustrate simulations, and more.

With an emphasis on 21st century skills including innovative play, critical thinking, logical reasoning, creative problem solving, and communication, this course will equip teachers and students to develop and collaboratively share their own Scratch programs. Course activities will focus on familiarizing participants with Scratch tools, developing classroom practices that enhance students' computational thinking skills, and collaborating with colleagues to support implementation efforts.

Drawing from key principles of computer science, this course will provide teachers with the knowledge and tools necessary to engage students in dynamic STEM learning experiences. All of the readings and activities included in this course support the Common Core Mathematics Content and Practice Standards, the Next Generation Science Standards (NGSS), and the ISTE Standards for Computer Science Educators.

Note: There is no required textbook for this course.

Required Texts and Course Materials

Textbook: There is no required textbook for this 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 for a 3-unit course (one week per unit).

National Standards Addressed in This Course

Common Core Standards for Mathematics <http://www.corestandards.org/the-standards/mathematics>

- Counting & Cardinality
- Operations & Algebraic Thinking
- Number & Operations
- Measurement & Data
- Geometry
- Ratios & Proportional Relationships
- The Number System
- Expressions & Equations
- Functions
- Statistics & Probability

Common Core Standards for Mathematical Practice

<http://www.corestandards.org/Math/Practice/>

- Standard 1: Make sense of problems and persevere in solving them
- Standard 2: Reason abstractly and quantitatively
- Standard 3: Construct viable arguments and critique the reasoning of others
- Standard 4: Model with mathematics
- Standard 5: Use appropriate tools strategically
- Standard 6: Attend to precision
- Standard 7: Look for and make use of structure
- Standard 8: Look for and express regularity in repeated reasoning

ISTE Standards <http://www.iste.org/standards/ISTE-standards/standards-for-teachers>

Next Generation Science Standards <http://www.nextgenscience.org/next-generation-science-standards>

Common Core Standards for English Language Arts <http://www.corestandards.org/ELA-Literacy/>

- Anchor Standards
- Reading: Literature
- Reading: Informational Text
- Reading: Foundational Skills
- Writing
- Speaking & Listening
- Language
- Range, Quality, & Complexity
- Literacy in Science & Technical Subjects

National Board for Professional Teaching Standards <http://www.nbpts.org/five-core-propositions>

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

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. Demonstrate through written reflection an understanding of current research which supports the integration of Scratch programming and how it relates to current Common Core, ISTE, and STEM standards.	NBPTS Prop. 1, 2 ISTE 3, 4, 5	CE 1, CE 2, CE 4, CE 6
2. Demonstrate effective use of tools, resources, and pedagogies that support implementation of Scratch programming activities in the classroom.	NBPTS Prop. 1, 2, 4 ISTE 1, 2, 3, 4, 5	CE 2, CE 4, CE 6

3. Analyze, design, facilitate, and reflect on Scratch design lessons.	NBPTS Prop. 1, 2, 3, 4, 5 ISTE 1, 2, 3, 4, 5	CE 2, CE 3, CE 4, CE 6
4. Collaborate with teaching peers and online colleagues to share insights and deepen their professional practice.	NBPTS Prop. 1, 2, 4, 5 ISTE 3, 4, 5	CE 1, CE 3, CE 4, CE 5, CE 6
5. Demonstrate through written reflection an understanding of current research which supports the integration of Scratch programming and how it relates to current Common Core, ISTE, and STEM standards.	NBPTS Prop. 1, 2 ISTE 3, 4, 5	CE 1, CE 2, CE 4, CE 6
6. Demonstrate effective use of tools, resources, and pedagogies that support implementation of Scratch programming activities in the classroom.	NBPTS Prop. 1, 2, 4 ISTE 1, 2, 3, 4, 5	CE 2, CE 4, CE 6
7. Analyze, design, facilitate, and reflect on Scratch design lessons.	NBPTS Prop. 1, 2, 3, 4, 5 ISTE 1, 2, 3, 4, 5	CE 2, CE 3, CE 4, CE 6
8. Collaborate with teaching peers and online colleagues to share insights and deepen their professional practice.	NBPTS Prop. 1, 2, 4, 5 ISTE 3, 4, 5	CE 1, CE 3, CE 4, CE 5, CE 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
Module 1 – Orientation and Introductions	<ul style="list-style-type: none"> • Introductions and goals for class • 1.1 Assignment: Submit Orientation • 1.2 Forum: Class Introductions 	4 pts 4 pts
Module 2 – About Scratch	<ul style="list-style-type: none"> • Read about development of Scratch: Mitch Resnick, and MIT Media Lab Lifelong Kindergarten. • Watch video webinar, read topic articles, write reflection, and participate in forum discussions. • 2.1 Assignment: Four Cs for Critical Reading and Reflection • 2.2 Forum: Share Two Cs 	10 pts 4 pts

Module Title	Module Assignments and Activities	Points Possible for Each Assignment
Module 3 – Research and Rationale	<ul style="list-style-type: none"> • Read research about constructionism. • Explore the rationale for integrating Scratch into classroom instruction. • Explore connections to relevant standards and STEM learning. • Read articles and watch videos provided in this topic then participate in forum discussions. • 3.1 Research Tweets 	10 pts
Module 4 – Getting Started	<ul style="list-style-type: none"> • Set up Scratch account. • Watch video tutorials • Explore Scratch community guidelines • 4.1 Assignment: Share Your Scratch Username (Google Spreadsheet) 	CR
Module 5 – Scratch Practice	<ul style="list-style-type: none"> • Watch a webcast • Explore Scratch project resources • Create a project • 5.1 Forum: Share Your Scratch Project 	4 pts
Module 6 – Scratch Lesson Resources	<ul style="list-style-type: none"> • Watch webinar • Explore practical Scratch resources • Explore how others are using Scratch in the classroom. • Recommend lessons to online colleagues • 6.1 Forum: Discuss the Webinar • 6.2 Forum: Online Lesson Evaluations 	4 pts 4 pts
Module 7 – Activity Design and Implementation	<ul style="list-style-type: none"> • Explore assessment strategies • Design Scratch activities relevant for your grade level. • Participate in peer lesson review • Conduct activities with your class and reflect. • 7.1 Assignment: Upload Your Scratch Plans (2) • 7.2 Forum: Sharing Plans 	20 pts 4 pts
Module 8 – Taking it Further	<ul style="list-style-type: none"> • Register for teacher account • Connect with Scratch Ed community • Explore possibility of Code club • 8.1 Forum Building Your Scratch Community 	4 pts
Module 9 – Final Reflection	<ul style="list-style-type: none"> • Create a Piktochart infographic summarizing course insights and next steps • 9.1 Assignment: Action Plan Infographic 	10 pts
	TOTAL POINTS	82 points

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.

Discussion 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.

Discussion 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/registrar-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/registrar-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 *reflect* on their personal and professional growth and *provide evidence* of how such reflection is utilized to manage personal and vocational improvement.

Critical Thinking: Students will *apply* critical thinking competencies by *generating* probing questions, *recognizing* underlying assumptions, *interpreting* and *evaluating* relevant information, and *applying* their understandings to new situations.

Moral Reasoning: Students will *identify* and *apply* moral reasoning and ethical decision-making skills, and *articulate* the norms and principles underlying a Christian world-view.

Service: Students will *demonstrate* service and reconciliation as a way of leadership.

Cultural and Global Perspective: Students will *identify* personal, cultural, and global perspectives and will employ these perspectives to *evaluate* complex systems.

Quantitative Reasoning: Students will accurately *compute* calculations and symbolic operations and *explain* their use in a field of study.

Information Literacy: Students will *identify* information needed in order to fully understand a topic or task, *explain* how that information is organized, *identify* the best sources of information for a given enquiry, *locate* and critically *evaluate* sources, and accurately and effectively *share* that information.