Independent Study Online Course Syllabus

Course Number: STEM 900
Course Name: Inspire STEM Learning

X Online  □ Distance Learning

Instructor: Paul Reimer
Phone number: 559-916-1314
Email: paulreimer@me.com
Web: reimermath.com

Units: 3
Grade Level: K-12

Course Description

This online course will introduce teachers to an interdisciplinary approach to learning that engages students in relevant, rigorous, real-world problem solving. The emphasis on college and career readiness in Common Core Standards requires student critical thinking, communication, and adaptability across the disciplines of science, technology, engineering, and mathematics (STEM). Students must be able to readily access relevant information, creatively and critically approach problems, and effectively communicate concepts and ideas. In this course, teachers will explore the rationale and specific strategies for selecting, planning, implementing, and assessing lessons that develop these 21st century skills in students. Teachers will reflect on lessons presented in their own classrooms; they will also network with the wider teaching community as they share and evaluate research, resources, lessons, and strategies.

Throughout the course, teachers will have multiple opportunities to connect current research to their own classroom practice. All the readings and activities included in this course support the implementation of Common Core Mathematics Standards and Practices, Next Generation Science Standards, and Common Core Standards for English Language Arts.

Course Dates:

Self-paced; students may enroll at any time and take up to one year to complete assignments.

You have up to one year from the date of registration, and no less than three weeks (one week per credit), to complete the course.

To register for courses go to http://ce.fresno.edu/cpd and log in
Technology Requirements

In order to successfully complete the course requirements, course participants will need Internet access, be able to 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. In the event that you need technical support, please contact your Internet Service Provider.

Moodle:
This course will be delivered totally online. Moodle is a learning management system that provides students access to online resources, documents, graded assignments, quizzes, discussion forums, etc. with an easy to learn and use interface. To learn more about Moodle go to: (http://docs.moodle.org/en/Student_tutorials). There are some student tutorials on the Center for Online Learning website at Fresno Pacific University – http://col.fresno.edu/student.

Moodle Site Login and passwords – (or other online course access information)
Students will need to have internet access to log onto http://ce-connect.fresno.edu. The username and password numbers for Moodle access will be sent to you by the university using the email address you submitted at the time of registration. The instructor will then contact you with a welcome letter and login instructions. If you need help with the username and password recovery please contact the Center for Professional Development at (800)372-5505, or (559)453-2000 during regular office hours - Mon-Fri 8:00 am to:00 5pm.

Getting Help with Moodle:
If you need help with Moodle, please contact the Center for Online Learning (COL), + by telephone 1-559-453-3460. Help by phone is available Mon-Thurs 8:00 am to 8:00pm and on Fridays from 8:00 am to 5:00 pm, or by filling out a “Request Services” form at http://col.fresno.edu/contact/request-services. Please identify that you are with the Continuing Education/Independent Studies department.

Required Texts and Course Materials


Several research-based journal articles are used with permission and available in pdf format in the course management system. Additional materials will include a variety online videos and web-based resources.
Student Learning Objectives (SLOs)
Evidence of Learning

1. Student demonstrated critical thinking and thoughtful engagement with the course objectives through reflective written assignments. (Assignments 1, 3, 4, 5, 6, 7, 8, 9, 10)
2. Student applied new learning to teaching practice through thoughtful lesson design and reflection. (Assignments 8, 9, 10)
3. Student identified key strategies and made appropriate connections to state/local standards and teaching in general. (Assignments 4, 5, 6, 7, 8)
4. Student demonstrated effective implementation of integrated STEM lesson planning and teaching. (Assignments 9 & 10)
5. Student interacted thoughtfully with online colleagues and contributed productively to online forum discussions, peer lesson review, and collaborative assignments (Assignments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)

Student Learning Outcomes in this course
Student will be able to:

<table>
<thead>
<tr>
<th>SLOs</th>
<th>Standards Addressed</th>
<th>CE program SLOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate through written reflection an understanding of current research which supports the integration of STEM lessons</td>
<td>NBPTS Prop. 1, 2</td>
<td>CE 1, CE 4, CE 6</td>
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<tr>
<td>2. Summarize and implement tools and strategies for engaging students in meaningful integrated STEM investigations</td>
<td>NBPTS Prop. 4</td>
<td>CE 2, CE 4, CE 6</td>
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<tr>
<td>3. Design, teach, and reflect on integrated STEM lessons</td>
<td>NBPTS Prop. 2, 3</td>
<td>CE 2, CE 3, CE 6</td>
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<tr>
<td>4. Collaborate with peers and colleagues both in person and online to share insights, strategies, and deepen their professional practice</td>
<td>NBPTS Prop. 5</td>
<td>CE 1, CE 3, CE 4, CE 5, CE 6</td>
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Standards Addressed in This Course

Common Core Standards for Mathematics
http://www.corestandards.org/the-standards/mathematics
Counting & Cardinality
Operations & Algebraic Thinking
Number & Operations in Base Ten
Number & Operations—Fractions

To register for courses go to http://ce.fresno.edu/cpd and log in
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

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 History/Social Studies, 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.

To register for courses go to http://ce.fresno.edu/cpd and log in
### Topics, Assignments and Activities

<table>
<thead>
<tr>
<th>Topic 1 – Getting Started</th>
<th>Topic 1 – Introductions and goals for class.</th>
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<tr>
<td>Topic 2 – What is STEM?</td>
<td>Topic 2 – Reflect on current use and benefits of STEM lesson essentials. Watch TED talk and participate in forum discussions. Explore STEM webinar and STEM Education Coalition website.</td>
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<tr>
<td>Topic 3– Research and Rationale</td>
<td>Topic 3 – Research the rationale for integrating STEM principles and instruction in the classroom. Read articles provided in this topic, watch TED talk, and participate in forum discussions.</td>
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<tr>
<td>Topic 4 – STEM Guiding Principles</td>
<td>Topic 4 – Using course text, explore and reflect on STEM guiding principles. Participate in forum postings and discussions.</td>
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<tr>
<td>Topic 5 – STEM Standards and Connections to Common Core</td>
<td>Topic 5 – Explore STEM connections to Common Core Standards. Reflect on application to current curriculum.</td>
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<tr>
<td>Topic 6 – Three Approaches to Integrated STEM</td>
<td>Topic 6 – Evaluate three approaches to integrated STEM teaching. Participate in forum discussions analyzing relevant approaches to current teaching situation.</td>
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<td>Topic 7 – Classroom examples</td>
<td>Topic 7 – Analyze video and text peer STEM lessons. Reflect on vignettes and analyze STEM approaches.</td>
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<td>Topic 8 – PBL and Assessment</td>
<td>Topic 8 – Explore models of project-based learning and assessment. Summarize key insights for lesson preparation.</td>
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<tr>
<td>Topic 9 – Resources and Sample Activities</td>
<td>Topic 9 – Explore and evaluate online STEM resources and activities. Network with online community via forum postings.</td>
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<tr>
<td>Topic 10 – Lesson Planning and Implementation</td>
<td>Topic 10 – Plan and implement effective integrated STEM lessons. Participate in peer lesson review. Reflect on lesson implementation and assessment.</td>
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To register for courses go to [http://ce.fresno.edu/cpd](http://ce.fresno.edu/cpd) and log in.
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 according to the procedures set forth in the Fresno Pacific University Catalogue. URL http://www.fresno.edu.

Grading Policies and Rubrics for Assignments

Each assignment is graded on a 4 point rubric. Assignment totals will be averaged for a final grade upon completion of the course. Please view the assignment rubrics in the course management system for detailed expectations for quality of work.

Students must earn a minimum of 80% to received credit
A – 90-100%, B= 80-89%, (anything below 80% will not receive credit.)

Grading Policies:
The discernment between an A or a B is at the discretion of the instructor based on the quality of work submitted (see assignment rubrics). Coursework falling short of a quality equaling a B or a Credit Grade will be returned with further instructions.
All assignments must be completed in order to receive a grade. In addition, all assignments 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.

Written assignments and papers need to follow APA formatting (1” margins, Times New Roman font - size 12, double spaced; centered title, student first and last name on paper. Instructors may add additional APA writing requirements as needed.)

Final Course Grade and Transcripts
When all work for the course has been completed, students will need to logon to the Center for Professional Development website (http://ce.fresno.edu/cpd) to “Submit Grade Form”. Once the instructor fills out the grade form online, students may log back in to request their Grade Report as well as order transcripts online. Please allow at least two weeks for the final grade to be posted. For more information see the Independent Studies Policies and Procedures that were sent to you when you received your course materials, or in your online course. They are available, also at http://ce.fresno.edu/cpd - under General Information > CPD Policies.

Course Number and Title: STEM 900 Inspire STEM
Learning Instructor: Paul Reimer
Date of Revision 1/20/16

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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. |

FRESNO PACIFIC UNIVERSITY STUDENT LEARNING OUTCOMES

| Student Learning Outcomes Oral Communication: | Students will exhibit clear, engaging, and confident oral communication – in both individual and group settings – and will critically evaluate content and delivery components. |
| Written Communication: | Students will demonstrate proficient written communication by articulating a clear focus, synthesizing arguments, and utilizing standard formats in order to inform and persuade others. |
| Content Knowledge: | Students will demonstrate 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. |

To register for courses go to http://ce.fresno.edu/cpd and log in
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.

Instructor/Student Contact

Since it is my hope that this course is a meaningful, interactive experience for students, there will be frequent course updates, notes from the instructor, and responses to assignment submissions.

References

Additional resources will be included in the course management system.

To register for courses go to [http://ce.fresno.edu/cpd](http://ce.fresno.edu/cpd) and log in