**Benedictine University**

**MSSCP 591 B Pedagogy of Inquiry STEM Teaching II**

**Catalog Description and Syllabus**

**Catalog Description**

This course will introduce inquiry teaching techniques and constructionist learning for the classroom teacher. Instructors will model these methods and students will participate in science classroom activities to develop an understanding of inquiry science. Students will develop investigations and present these detailed investigations in a group presentation format. Students will also experience the New Generation Science Standards and will participate in engineering and design activities.

**Course Overview**

This course will extend students understanding of inquiry science teaching methods. The course is also based on a constructionist learning method. Inquiry is a method of instruction and constructivism is a method of learning. There is an extensive body of knowledge about the teaching and learning process but teaching and learning are not synonymous. The course begins with this premise and develops teaching skills that will enhance the student learning process. Classroom management skills are introduced and modeled by the instructors. Concept development in students is explored through a constructionist approach. A variety of classroom activities will be used to engage participants in their own understanding of inquiry science. Major science themes from the National Science Education Standards are used to organize the units of study. Participants will model engineering teams and will develop solutions for identified problems. Students will factor in the cost of materials and labor into their design solution. Journals will be kept that track the participants’ progress. Investigation into a science problem will also be required.

**Course Information**

This is a follow up to the introductory course for the Master of Science in Science Content and

Process degree.

The course will meet for five consecutive days during the summer. Tentative dates for two, five day sessions are July13th n through July 17th Class meetings will be 8:30 a.m. to 3:30 p.m. totaling approximately 35 hours.

**Texts and Required Readings**

NSTA Press: Science for the Next Generation; Preparing for the New Standards.

ISBN 978-1-936959-26-6 (paperback)

**Student Learning Objectives**

At the conclusion of this class the participants will be able to:

* Describe the characteristics of the New Generation science standards
* Describe the differences between a traditionally based science classroom and an inquiry based science classroom.
* Using science notebooks to track science investigations
* Using claims and evidence to solve testable questions.
* Design investigations that are based on New Generation Science Themes
* Use classroom management techniques that will enhance the learning process.
* Develop science process skills to carry out classroom investigations.
* Alter existing science activities so they become more inquiry based.
* Incorporate Common Core Math investigations into their classroom investigations.
* Participate in solving an engineering design problem within a collaborative team.
* Use environmentally based lessons to engage students.
* Make interdisciplinary connections to science within their curriculum.
* Demonstrate thinking skills and knowledge of core science concepts.

**MSSCP 591 Topic Schedule**

Monday

* Inquiry Teaching
* Constructivist Learning
* Applying the New Generation Science Standards engineering Design and cross cutting concepts to a proposed problem.
* Using science notebooks to collect Data Classroom

Tuesday \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

* Constructing Inquiry Based Lessons on Gears, Bungees
* Using the Engineering and design process, solve a problem using gears and bungees
  + - Gather and graph data from the experiment to interpret the results. Students will understand the linear relationship between the independent and dependent variables and will be able to extrapolate the data to obtain the desired target range.
    - Incorporating literacy in science lessons

Wednesday \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

* Literacy and Making Field Trips More Than a Day Off
* Experiencing Inquiry and Constructivism
* Field Museum - Observation Based Learning
* Connect common Core Literacy with museum exhibits

Thursday \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

* Technology
* Integrate technology into Inquiry Based Lessons
* PhET - s a suite of research-based interactive computer simulations for teaching and learning physics, chemistry, math, and other sciences. PhET simulations can be run online or downloaded for free from the PhET website.
* [code.org](http://code.org) - Participants will learn code
* SketchUp - is a 3D modeling computer program to create Kinex Skyscraper Design
* Kahootz - toolset used to make 3D animations using the pre-made objects and backgrounds.

Friday \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

* Earth, Space and Climate Change Connections
* Inquiry Based Lessons - Hydrosphere, Greenhouse Gases, Energy
* Presenting final investigations.

**Course instructors:**

Jim Effinger

Science instructor retired, Naperville North High School

Golden Apple Fellow

Sandra Flowers

Retired Instructor, Longfellow Elementary School, Oak Park, IL

Golden Apple Staff

Bill Grosser

Science instructor, Oak Park and River Forest High School

Golden Apple Fellow

Ron Hale

Teach Plus; Stephan Hyat Elementary School

Golden Apple Fellow

Louise Huffman

Middle School instructor, Kennedy Jr. High School, Naperville, IL

Golden Apple Fellow

John Lewis

Science instructor, Glenbrook South High School

Golden Apple Fellow

Wayne Wittenberg

STEM Instructor, Ben Franklin Elementary School, Glen Ellyn, IL

Golden Apple Staff

1. **Course Policies**

**Grading procedures**  
Students wishing to earn an “A” grade can do so by actively participating in all aspects of the class and keeping a complete logbook/journal for the course. The logbook/journal should include careful notes on lesson plans, demonstrations, and observations, including diagrams wherever applicable. It should also include a record of reflections, questions, experiences, and ideas.  
  
Grading will be based upon quality of work with components weighted as follows:  
  
**I. Logbook/Journal (30 points possible):**

Participants will be required to document all experiments and demonstrations, including descriptions, diagrams, observations, and analyses in a scientific journal. Students will also be required to formulate, record, ask, and discuss questions and draw conclusions based on their reflections and discussions, and to record these in their journal.

1. Record or documentation of each exploratory activity. 5 points

2. Use of labeled diagrams and visual representation of activities. 5 points

3. Reflective comments representing processing of information and formulation of constructions. 15 points

4. Documentation of presenter and literature connections. 5 points

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reflection Paper Rubric** | **Exceeds Standards**  **4 points** | **Meets Standards**  **3 points** | **Progressing**  **1-2 points** | **Not Meet**  **0 points** | **Score** |
| **Format** | Paper is neatly typed, double-spaced, 12-point TNR font, one-inch margins, and 2.5 pages in length. | Paper is neatly typed, double-spaced, 12- TNR font, one-inch margins and 2 pages in length. | Formatting rules inconsistent, shorter than 2 pages in length. | Formatting rules ignored,  Shorter than 1.5 pages |  |
| **Grammar and Spelling** | 1 or no errors. | 2-3 minor errors. | 4-5 minor errors | Lacks basic proofreading or contains major errors. |  |
| **Organization** | Well-organized, well written, easy to read and understand. | organized but “flow” could be improved. | Organization is evident, but not consistent through-out the piece | Organization lacking and impossible to follow. |  |
| **Reflection** | Shows strong evidence of reasoned reflection and depth. Multiple examples from the text and the workshop are included. | Shows evidence of reasoned reflection.  Multiple examples from the text and the workshop are included. | Lacks some reflection and depth. Some examples from the text and the workshop are included. | Reflective thought is not evident. No evidence of examples are included. |  |
| **Completeness** | Thoroughly addresses all elements contained within all 4 of the stated objectives of assignment and extends beyond. | Addresses all elements contained within four of the stated objectives of assignment. | Somewhat Addresses all elements contained within three of the stated objectives of assignment. | Fails to address all the elements contained within any of the stated objectives of assignment. |  |
| **\***Objective 1: Provide an overview of your current science program. | Objective 2: approach, technique, or inquiry / management tool. | Objective 3: approach, technique, or inquiry / management tool. | Objective 4: approach, technique, or inquiry / management tool. |  | + /20 |

**II. Reflective Paper (20 points possible)**

**IV. Course Policies continued…**

**III. Class participation (50 points possible):**

Participants will be expected to take active roles in both full-class and small group discussions.

* 50-45 points: Is always prompt and is a regular attendee. Always participates actively in both small- and large-group settings. Always willing to share ideas and reflections on activities. Listens respectfully when others talk. Communicates results and shares data in a clear and concise fashion. When appropriate, offers constructive criticism of peers’ contributions to class discussions.
* 44-40 points: Is a prompt, regular attendee. Participates actively in both small- and large-group settings. Willing to share ideas and reflections on activities. Listens when others talk. Communicates results and shares data. Offers constructive criticism of peers’ contributions to class discussions.
* 39-35 points: Is a prompt, regular attendee. Participates in small-group settings. Shares ideas and reflections on activities when called upon. Listens when others talk. Makes an effort to communicate results and share data. Makes and effort to offer constructive criticism of peers’ contributions to class discussions.
* 34-0 points: Is an irregular or frequently tardy attendee. Rarely participates in either small- or large-group settings. Does not listen when others talk. Offers minimal or inappropriate comments on peers’ contributions to class discussions.

The final grade will be determined on the following scale:

A Excellent. Denotes work that is consistently at the highest level of achievement in a graduate college or university course.

B Good. Denotes work that consistently meets the high level of college or university standards for academic performance in a graduate college or university course.

C The lowest passing grade. Denotes work that does not meet in all respects college or university standards for academic performance in a graduate college or university course.

F Failure. Denotes work that fails to meet graduate college or university standards for academic performance in a course.

**Attendance**  
Students are required to attend all classes and to participate in class discussions, small group activities, experimental, and experiential group activities.

**Cheating**  
No forms of cheating will be tolerated. Please refer to the Benedictine University Academic Honesty Policy at http://www.ben.edu/ahp/

**Statement for Students with Physical Disabilities:**  
If you have a documented learning, psychological, or physical disability, you may be eligible for reasonable academic accommodations or services. To request accommodations or services, contact the Academic Resource Center in Kindlon Hall, Room 249. All students are expected to fulfill essential course requirements. The University will not waive any essential skill or requirement of a course or degree program.