Science/Mathematics Education
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SCI-5v06: Field Ecology

Summer 2004 Syllabus

INSTRUCTORS

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DESCRIPTION

The purpose of this intensive field-based course is to address the critical content and concepts of science and various teaching approaches in a variety of authentic learning environments. Hands-on, inquiry-based activities will be incorporated in classroom lessons to familiarize teachers with new and current resources (i.e., TEXTEAMS Vistas, other TEA products, and GEMS/FOSS kits).

Emphasis will be placed on topic integration and intervention strategies. The context of watersheds provides the unifying theme; water chemistry will be analyzed both qualitatively and quantitatively at all sites. Original and archived data will be used as the medium for practice with appropriate tools, analysis procedures, and presentation models.

OVERVIEW

Teachers will be required to keep a journal recounting experiences, observations, and data. Entries completed after each lesson and following all other sessions will highlight methods for using information to include all students in the learning of science. These reflections will allow teachers to produce an essay to be used in their classrooms with their students in support of materials collected during the field experience. Concise, focused, scientifically- and educationally-sound journal summaries will be compiled to highlight methods for actively engaging all students in the learning of science.

This course begins the development of a comprehensive virtual field trip web site based on the summer experience. To that end, teachers will be instructed in the use of various scientific and educational technologies and exposed to an array of curriculum tools and resources. Each participant will produce high-quality lesson plans that incorporate materials in ways that meet the specific needs of their respective students. By the end of the fall/spring coursework, each teacher will have produced a portfolio that documents his/her understanding of science and includes hands-on, inquiry-based lessons and technology-based applications for the classroom that are aligned with the TEKS, District Standards, and TAKS objectives.

TEXTBOOK (required)

The Sciences: An Integrated Approach, 4th Edition, by James Trefil, Robert M. Hazen (ISBN: 0-471-21963-0). This resource integrates major concepts from physics, chemistry, astronomy, earth sciences, and biology to help anyone become science-literate. Even readers with little or no science background will find this unique book an indispensable guide to understanding the latest headlines, controversies, and scientific developments. The new edition keeps pace with the dynamic nature of the sciences by incorporating the most up-to-date discoveries in all five disciplines.

CLASS FORMAT

The course is built around 5 field experiences to local science-related sites. The structure includes 5 pre-trip classes, 5 local day trips, and 5 independent online post-trip follow-up modules. Pre-trip classes will be held on the UTD campus (Richardson) from 9:00AM until noon. Local day trips will start at the field locale at 10:00AM and conclude by 3:00PM. Post-trip follow-up is completed through 1-hour online modules accessible through a web browser.

The typical daily timeline for summer pre-trip classes is:

9:00 - 9:15	Experiential training activity
9:15 - 10:45	Inquiry-based process/content lesson and TEKS/TAKS analysis
10:45 - 11:30	Application of technology to classroom activities, journal entries
11:30 - 12:00	Pre-trip discussions: site features, data collection, background research, and teacher perceptions of former classroom students' understanding

The typical daily timeline for summer local day trips is:

10:00 - 12:00	Field experience facilitated by local research scientists
12:00 - 1:00	Working lunch (instructor reading of essays on the nature of science)
1:00 - 2:30	Individual data collection and research investigations
2:30 - 3:00	TEKS/TAKS discussion to integrate teachers' investigations and the implications for applications within individual classrooms

MEETING SCHEDULE

Date/ Time	Topic/ Activities	Process & *Content* TEKS	
MODULE I: EARTH'S ENVIRONMENT			
6/7/04 UTD 9:00AM to Noon	*Experiential training*: Community Juggling (relationships and interdependencies) *Laboratory activities*: Learning to See (methods of observation and data collection techniques) *Instructional skills*: Integrating process skills and environmental topics	6.1A, B 6.2B-E 6.3A 6.4A, B *6.5B* *6.7B* *6.8B, C*	7.1A, B 7.2B-E 7.3A 7.4A, B *7.7B* *7.8B* *7.12A-D*
6/8/04 Field Site 10:00AM to 3:00PM	*Local day trip:* Heard Natural History Museum and Sanctuary *Field investigation:* Wetlands habitat and ornithology *Data collection:* water quality and environmental variables of a nature preserve *Content knowledge:* Changes in geology, biomes, and water chemistry	6.1A, B 6.2A, B 6.4A *6.5B* *6.7B* *6.8B, C*	7.1A, B 7.2A, B 7.4A *7.7B* *7.8B* *7.12A-D*
6/9/04 Online	*Journal assignment:* There and Back I *Research focus:* Ecosystems & habitat destruction *Intervention strategies*: Methods for incorporating the uncertainty of science into lessons	6.2A-E 6.3A-E *6.5B* *6.7B* *6.8B, C*	7.2A-E 7.3A-E *7.7B* *7.8B* *7.12A-D*
MODULE II: HUMAN BODY SYSTEMS			
6/10/04 UTD 9:00AM to Noon	*Experiential training*: If I had a Hammer *Laboratory activities*: Cultivating Curiosity (developing questions for exploration in the field) *Instructional skills*: Choosing tools for field and classroom investigations	6.1A, B 6.2B-E 6.3A 6.4A, B *6.5B* *6.7B* *6.8B, C* *6.10A* *6.12 A-C*	7.1A, B 7.2B-E 7.3A 7.4A, B *7.7B* *7.8B* *7.12C* *7.8C* *7.9B* *7.10B*

6/11/04 Field Site 10:00AM to 3:00PM	*Local day trip:* Dallas Zoo *Field investigation:* Endangered species and animal behavior *Data collection:* Water quality and environmental variables of a controlled setting *Content knowledge:* Interactions of body systems, physics and chemistry	6.1A, B 6.2A, B 6.4A *6.5B* *6.7B* *6.8B, C* *6.10A* *6.12 A-C*	7.1A, B 7.2A, B 7.4A *7.7B* *7.8B, C* *7.9B* *7.10B* *7.12C*
6/14/04 Online	*Journal assignment:* There and Back II *Research focus:* Adaptation and survival *Intervention strategies*: Methods for incorporating personal relevance into lessons	6.2A-E 6.3A-E *6.5B* *6.7B* *6.8B, C* *6.10A* *6.12 A-C*	7.2A-E 7.3A-E *7.7B* *7.8B, C* *7.9B* *7.10B* *7.12C*
MODULE III: MOTIONS OF THE EARTH AND MOON			
6/15/04 UTD 9:00AM to Noon	*Experiential training*: Balancing Acts (cause and effect relationships) *Laboratory activities*: Arranging and Re-arranging (preparing for and analyzing data) *Instructional skills*: Using images, graphs, charts to enhance student understanding	6.1A, B 6.2B-E 6.3A 6.4A, B *6.5A, B* *6.6B* *6.7B* *6.8B* *6.13A, B*	7.1A, B 7.2B-E 7.3A 7.4A, B *7.7A, B* *7.8B* *7.12C* *7.14B*
6/17/04 Field Site 10:00AM to 3:00PM	*Local day trip:* Parkhill Prairie *Field investigation:* Natural cycles, phases, and seasonal change *Data collection:* Water quality and environmental variables of a grassland *Content knowledge:* Methods for encouraging critical thinking and problem solving	6.1A, B 6.2A, B 6.4A *6.5A, B* *6.6B* *6.7B* *6.8B* *6.13A, B*	7.1A, B 7.2A, B 7.4A *7.7A, B* *7.8B* *7.12C* *7.14B*
6/18/04 Online	*Journal assignment:* Painting the Whole Picture *Research focus:* Change over time *Intervention strategies*: Methods for incorporating critical voice into lessons	6.2A-E 6.3A-E *6.5A, B* *6.6B* *6.7B* *6.8B* *6.13A, B*	7.2A-E 7.3A-E *7.7A, B* *7.8B* *7.12C* *7.14B*
MODULE IV: PROPERTIES AND CHANGES IN MATTER			
6/21/04 UTD 9:00AM to Noon	*Experiential training*: Who was I? (similarities and differences) *Laboratory activities*: Sharing the Excitement (interpretation of qualitative and quantitative data) *Instructional skills*: Alternative assessments (i.e., portfolios, nature writing, student inclusion, skill level differentiation) and lesson planning for special groups (i.e., cultural, socio-economic, language proficiency)	6.1A, B 6.2B-E 6.3A 6.4A, B *6.5B* *6.6C* *6.7B* *6.8B, C* *6.9C*	7.1A, B 7.2B-E 7.3A 7.4A, B *7.7B* *7.8A, B* *7.10B* *7.12C* *7.14C*

6/22/04 Field Site 10:00AM to 3:00PM	*Local day trip:* Dallas Aquarium *Field investigation:* Tolerance and range of organisms *Data collection:* Water quality and environmental variables in marine and freshwater systems *Content knowledge:* Interactions among biotic and abiotic portions of the environment	6.1A, B 6.2A, B 6.4A *6.5B* *6.6C* *6.7B* *6.8B, C* *6.9C*	7.1A, B 7.2A, B 7.4A *7.7B* *7.8A, B* *7.10B* *7.12C* *7.14C*
6/23/04 Online	*Journal assignment:* Communicating Connections *Research focus:* Impact of humankind *Intervention strategies*: Methods for incorporating student negotiation into lessons	6.2A-E 6.3A-E *6.5B* *6.6C* *6.7B* *6.8B, C* *6.9C*	7.2A-E 7.3A-E *7.7B* *7.8A, B* *7.10B* *7.12C* *7.14C*
MODULE V: MOTION, FORCES, MACHINES, AND ENERGY			
6/28/04 UTD 9:00AM to Noon	*Experiential training*: Rope Tricks (individual/team problem-solving and innovative research techniques) *Laboratory activities*: Getting Answers (experimental design and investigative models) *Instructional skills*: Methods for refining questions and implementing individual and group projects (preparing efficient, safe, and effective 'cohesive' activities)	6.1A, B 6.2B-E 6.3A 6.4A, B *6.5B* *6.6C* *6.7B* *6.8B* *6.9B, C*	7.1A, B 7.2B-E 7.3A 7.4A, B *7.6C* *7.7B* *7.8A, B* *7.12C*
6/29/04 Field Site 10:00AM to 3:00PM	*Local day trip:* The Science Place *Field investigation:* Forces at Play (mechanics of interactive displays and impact of visual presentation) *Data collection:* Water quality and environmental variables of a city park (urban area) *Content knowledge:* Forces exerted by living and non-living systems	6.1A, B 6.2A, B 6.4A *6.5B* *6.6C* *6.7B* *6.8B* *6.9B, C*	7.1A, B 7.2A, B 7.4A *7.6C* *7.7B* *7.8A, B* *7.12C*
6/30/04 Online	*Journal assignment:* Painting the Whole Picture *Research focus:* Technology and Action! *Intervention strategies*: Combining content and process and methods for incorporating shared control into lessons	6.2A-E 6.3A-E *6.5B* *6.6C* *6.7B* *6.8B* *6.9B, C*	7.2A-E 7.3A-E *7.6C* *7.7B* *7.8A, B* *7.12C*
FIELD EXPERIENCE SUMMARY			
7/1/04 UTD 9:00AM to Noon	Guided discussion and end of course evaluation *Looking forward to the fall and spring…*	6.2D 6.3A, D, E	7.2D 7.3A, D, E

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