

SIED-5321-001 Science Tools, Standards, Technology and Safety/Ethics CRN 22361 SYLLABUS, Spring 2014

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Instructor information

- **Instructor:** Dr. Brian H. Giza, UTEP Teacher Education.
- **Office:** Education Room 801C. Phone: 915-747-6655 or 915-747-8049. Dr. Giza's in-person office hours are on Tuesdays and Wednesdays from 2:00 to 4:00 PM in EDUC 801C, and his online office hours for this course are on Tuesdays from 7 to 8:30 PM in

the Blackboard course. The best way to contact Dr. Giza is via email at **bhgiza@utep.edu**. Issues related to the course assignments, etc. should be sent via the Blackboard course email. Dr. Giza does not accept any assignments via UTEP email.

- **Online only.** This is a fully online course delivered via UTEP's Blackboard online instructional environment

Course Description:

Integrated, science-technology thematic learning. Develops understanding of important science teacher resources, basic science education and lab tools, state and national standards for science teaching, curriculum alignment, laboratory and classroom safety, and professional ethics for science educators. (Source: UTEP 2012-2013 Online Academic Catalogue at http://catalog.utep.edu/preview_course_nopop.php?catoid=7&coid=5885).

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Course Objectives and Standards Alignment

This course is aligned with Texas State Board of Educator Certification "Master Science Teacher Standards" (MST Standards). The MST Standards are available in online at:

<http://www.tea.state.tx.us/index2.aspx?id=5938>

SIED 5321 addresses components in nearly each standard. The standards are listed below and specific elements addressed by this course are included in comments after each standard.

- **Standard I. Content:** The Master Science Teacher knows and understands and is able to mentor the teaching of the Texas Essential Knowledge and Skills (TEKS) in science. (*This course addresses the history of state and national science standards.*)
- **Standard II. History, Nature, and Context of Science:** The Master Science Teacher understands, applies knowledge of, and guides others to understand the historical perspectives of science, the nature of science, and how science interacts with and influences personal and societal decisions. (*This course addresses the history of science education and touches on some aspects of the history of science.*)
- **Standard III. Scientific Inquiry:** The Master Science Teacher understands, applies knowledge of, and guides others to understand processes of scientific inquiry and the role of inquiry in science learning and teaching. (*This course addresses the development of inquiry approaches, including controversies over the implementation of inquiry science in the classroom.*)
- **Standard IV. Alignment and Integration:** The Master Science Teacher understands, applies knowledge of, and guides others to understand the Texas Essential Knowledge and Skills (TEKS) and the national science standards and knows the importance of

vertical alignment of the TEKS and integration of the science disciplines with one another and with other disciplines. (*This course addresses the history of state and national science standards and follows certain strands through grade levels.*)

- **Standard V. Safety:** The Master Science Teacher understands, implements, models, and advocates: safe classroom, field, and laboratory experiences; safe use of equipment and technology; and ethical use of organisms and specimens and guides others to do the same. (*This course addresses classroom laboratory safety in terms of state and national initiatives. In addition it models the use of technology, especially web-technologies, in the science classroom.*)
- **Standard VI. Inclusive Instruction:** The Master Science Teacher uses and guides others to use a variety of instructional strategies and resources to meet the diverse needs of all learners. (*This course addresses the role of the science teacher in developing and implementing science content that is delivered equitably to all learners, including traditionally underrepresented groups in science.*)

Prior knowledge and course technical requirements

This is a fully online graduate course in science education. To perform well in this course an individual should be familiar with using the Internet and the World-Wide Web. **Tools:** Students should have access to a modern (preferably Windows XP or above) computer onto which they may save files and install software. They should have a fast Internet connection and access to Internet Explorer 6 and above or Firefox 6 and above with the latest Flash plugin installed (Firefox 11 is recommended). They will need to have the ability to open and print Adobe Acrobat (PDF) documents. They will need to be able to play MP3 audio and MP4 (H.264 codec) video. They should be able to write well and be able to format documents with Microsoft Office Word or a similar word processor such as OpenOffice 3 Write (OpenOffice 3 will be used and demonstrated during the course). Students will be creating spreadsheets that evaluate mathematics expressions. The course includes some basic (high school level) physics, life science, Earth science and chemistry content with the expectation that the participant will be familiar with that content. Students should be familiar with the Blackboard learning environment including the use of discussion posts, attaching files, and downloading files. They should be able to name files according to class requirements. Course software will all be Windows-based although materials will be delivered using cross-platform file types (JPG, GIF, PPT, PDF, MP3, MP4, HTML, SWF or FLV Flash, Word Doc and RTf format). To ensure that everyone can access and interact with each other's files, Office 2007-2010 proprietary file types (docx, xlsx, pptx) are banned as they are not universally supported and students must be able to share files using more commonly supported Office 2000-2003 file types (Office 2007 or above users may save in these older file types and must do so in this course).

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HB 2504 requirements

HB 2504 Requirements (1) course requirements, assignments, examinations and (3) a general description of the subject matter of each lecture or discussion:

HB 2504 requirement 1: Course requirements, assignments, examinations (Final Project)

The final project for this course is a standards-aligned, grade-level appropriate science lesson in Word document format instructional activity targeted at pupils or other teachers that incorporates a web-based technology component. The lesson should include a modification for special needs students and a teacher resource page. It should include APA format references and a brief discussion of the technology tools and how they relate to the lesson tasks, as well as a description of the pedagogical strategies used in the activity. An assessment with a rubric for evaluating mastery must be included. The final activity is worth 20 points. There are also weekly activities worth approximately ten to fifteen points - usually one, sometimes two per week. In many of these weekly activities students in the course must read and respond to, or create and share with colleagues' documents and files that are aligned to various elements of the Texas Master Science Teacher Standards. The sum of all the activity points is not meant to total 100 points - it could be more or less than that number. You may divide points possible by points received to calculate a digital percent grade. Make up or late work is not accepted.

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Class activities - a summary of activities in this course

These activity descriptions are general, and do not contain the detail, resources, or rubrics that will be found in each activity's instructions. The broad descriptions provided here give some idea of the kind of work that will be done during the course

- Turnitin practice
- Tools, tasks, and strategies in the science classroom
- History of science standards research paper
- Technology-enhanced Science activity paper
- Doing science labs over the web
- Science collaboration with web-tools
- Spreadsheets and web-resources.
- Science safety surveys
- Science and Universal design for Learning
- Science, special needs and Individualized Education Plans
- 'Bad science' research paper
- Science teaching and societal controversies

- A final project in the form of a technology-enhanced, standards-aligned science lesson that incorporates appropriate modifications for special needs populations.

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Calendar and HB 2504 requirement 3: a general description of the subject matter of each lecture or discussion

The UTEP Spring 2014 course calendar is available online at <http://academics.utep.edu/Default.aspx?tabid=69121>. Classes begin January 21, 2014. A list of course dates, **learning foci (in bold)**, and *key activities (italicized)* is included below. The course uses Dr. Giza's **Tools, Tasks, & Strategies** framework for integrating technology and curriculum. Activities are generally assigned and due on Tuesday evenings unless noted via a Blackboard notice (E.g.: if Dr. Giza determines that there is a Blackboard access issue an assignment date may be adjusted. Do not send any assignments via UTEP email).

- Week 1: Jan 22-28. **Introductions** Introduction to the Blackboard course, introduction to Turnitin. Introduction to each other (course colleagues). Getting to know you activity 1.
- Week 2: Jan 28- Feb 3. **Tools 1:** Web resources. Research on the web, web resources for science teaching. Wikis and webquests. *Turnitin activity 1*. Readings: chapter 14 of *Science for All Americans* (Project2061, 1990) <http://www.project2061.org/publications/sfaa/online/chap14.htm>
- Week 3: Feb 4-Feb 10. **Standards 1:** History of standards in science education. The National standards movement. The standards movement in Texas. Reading: A History of standards in Texas. *Benchmarks for Science Literacy* Chapter 13 (<http://www.project2061.org/publications/bsl/online/index.php?chapter=13>) and Chapter 1: A New Conceptual Framework (pages 7-22) of *A Framework for K12 Science Education* (http://www.nap.edu/catalog.php?record_id=13165)
- Week 4: Feb 11-Feb 17. **Tasks 1, Standards 2:** Task analysis. Creating a standards-aligned lesson. Reading: About ScienceNetlinks at <http://sciencenetlinks.com/about-science-netlinks/> and the Digital Library for Earth Science Education (DLESE) at <http://www.dlese.org/library/index.jsp>
- Week 5: Feb 18-Feb 24.: **Strategies 1.** Pedagogy in science classrooms. Hands-on/minds-on, constructivism and its origins, Problem-Based Learning, Cooperative Learning. What brain research says about how children (or adults) learn science. Reading Donovan & Bransford Part III: http://www.nap.edu/openbook.php?record_id=11102&page=27.
- Week 6: Feb 25-Mar 3. **Strategies 2.** Science Safety. The Texas Science Safety Manual. (Dana Center: <http://www.utdanacenter.org/sciencetoolkit/index.php>). NSTA Science Safety (<http://www.nsta.org/portals/safety.aspx>). Ken Roy & Dr. Sandra West.
- Week 7: Mar 4-Mar 17. **Strategies 3:** Working with special needs populations. Universal Design for Learning (UDL) in Science. Brain research and learning differences:

<http://www.cast.org/teachingeverystudent/ideas/tes/chapter2.cfm>. Activity: CAST UDL
Science Writer: <http://www.cast.org/research/projects/tws.html> and
<http://sciencewriter.cast.org/welcome>

- **Week 8: Mar 10-14 (Spring Break).**
- Week 9: Mar 18-Mar 24. **Strategies 4:** Ethical issues in science teaching 1 (teaching all students). Women and minorities in science. Teacher question distribution and recognizing student input. Reading: National Research Council: Beyond Bias and Barriers Chapter 6 (http://www.nap.edu/openbook.php?record_id=11741&page=214) and podcast (<http://media.nap.edu/podcasts/nax12beyondbias.mp3>).
- Week 10: Mar 25-Mar 31 (Cesar Chavez Day Mar 31). **Strategies 5:** Controversies in science (Evolution, Global Warming, etc.). Slesnick: <http://learningcenter.nsta.org/files/PB190X-free.pdf> and Science, Evolution, and Creationism: http://www.nap.edu/catalog.php?record_id=11876 and podcast at <http://media.nap.edu/podcasts/nax48scienceevo.mp3>. Bad science research post due by Tuesday April 2 by 11:59 PM.
- Week 11: Apr 1 - Apr 7 **Strategies 5:** Tools, accessibility, and ethical issues in science teaching 1 (technology access, science and the world). PortableApps.
- Week 12: Apr 8-Apr 14. **Tools 3:** Spreadsheets online and in the classroom. E-books and resources. DLESE Climate station activity: <http://serc.carleton.edu/introgeo/mathstatmodels/examples/XLstats.html> the Earth Exploration Toolbook at <http://serc.carleton.edu/eet/chapters.html> and Tony Wayne's Roller Coaster Physics e-book.(<http://vip.vast.org/BOOK/HOME.HTM>)
- Week 13: Apr 15-Apr 21. **Tools 4:** Hyperlinking documents (Word, HTML, & PDF). SWF and MPG4 presentations.
- Week 14: Apr 22-Apr 28. **Tools, Tasks, & Strategies:** Creating a technology-enhanced science lesson 1. Final project activity part 1. Reading Loucks-Horsley et al *Principles of effective professional development for mathematics and science education: A synthesis of standards (NISE Brief Vol. 1, No. 1)*. Available at http://www.wcer.wisc.edu/archive/nise/Publications/Briefs/NISE_Brief_Vol_1_No_1.pdf
- Week 15: Apr 29-May 5. **Tools, Tasks, & Strategies:** Creating a technology-enhanced science lesson 2. Final Project activity part 2. Reading Bybee: et al. (2006). *The BSCS 5E Instructional Model: Origins and Effectiveness. A Report Prepared for the Office of Science Education, National Institutes of Health (Appendix D)*. Available online at: [http://science.education.nih.gov/houseofreps.nsf/b82d55fa138783c2852572c9004f5566/\\$FILE/Appendix%20D.pdf](http://science.education.nih.gov/houseofreps.nsf/b82d55fa138783c2852572c9004f5566/$FILE/Appendix%20D.pdf)
- Week 16: May 6 -May 12. (May 8, last day of classes). Final projects due May 6.
- Week 17: May 13. "Final Exams" - Reviews of Final Projects due.

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HB 2504 Requirement (4) Readings:

There are many for this course - approximately a chapter per week, but all are available online for free. In addition to identifying high-quality readings and resources for this course, we have considered student budgetary needs in selecting materials for the course - note that most of the textbooks have a free-to-read online version.

There are additional readings available online from the "readings" page of the Blackboard course environment or from links in the syllabus. These readings are either in Adobe Acrobat or HTML format. The Adobe Acrobat reader is free and may be obtained from Adobe's website at: www.adobe.com.

The [calendar of activities](#) includes links to the individual chapters of the online texts. Excerpts and individual chapters from key texts used in the course include:

- "Science for All Americans" which is available both in print form and in online reading format at: <http://www.project2061.org/publications/sfaa/online/sfaatoc.htm?ql>
- "Science, Evolution, and Creationism" which is available for purchase or for free reading online at: http://www.nap.edu/catalog.php?record_id=11876 Publication data: ISBN-10: 0-309-10586-2 or ISBN-13: 978-0-309-10586-6 published by the National Academies Press. A brochure summarizing the contents is available online in both English and Spanish at the same link.
- The "Benchmarks for Science Literacy" which is available for reading online at <http://www.project2061.org/publications/bsl/default.htm>. (A Spanish language version is available online at <http://www.project2061.org/esp/default.htm>).
- The "Texas Science Facilities Standards" which is available for reading online or for purchase at <http://www.utdanacenter.org/sciencetoolkit/safety/facilities.php>. This is part of the Science TEKS resources online at the UT Dana Center at <http://www.utdanacenter.org/sciencetoolkit/index.php>
- "How Students Learn: Science in the Classroom" by M. Suzanne Donovan and John D. Bransford, editors, Committee on How People Learn: A Targeted Report for Teachers, National Research Council, which is available for reading or as a free pdf download online at http://books.nap.edu/catalog.php?record_id=11102.
- Board on Science Education (BOSE). (2012). A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. National Research Council. Washington, DC: The National Academies Press, 2012. Available for reading or as a free pdf download online at http://www.nap.edu/catalog.php?record_id=13165.
- Loucks-Horsley, S., Stiles, K., & Hewson, P. (1996, May). Principles of effective professional development for mathematics and science education: A synthesis of standards (*NISE Brief Vol. 1, No. 1*). Madison: University of Wisconsin–Madison, National Institute for Science Education. Free download from http://www.wcer.wisc.edu/archive/nise/Publications/Briefs/NISE_Brief_Vol_1_No_1.pdf

- National Research Council (NRC). (2007). *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*. Committee on Maximizing the Potential of Women in Academic Science and Engineering, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. Available for reading or as a free pdf download online at http://www.nap.edu/catalog.php?record_id=11741

Access to freely distributable and open source software for Windows will be used for various projects in the classroom - this software is available for free in "Portable Apps" form from <http://portableapps.com>.

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Dr. Giza's teaching approach

This course is meant to help you teach and use technology effectively in the science classroom, as well as playing a leadership role in integrating technology in science education. Your contribution in the development of collaborative classroom lessons is a critical component of the course. Dr. Giza primarily uses the Blackboard Assignments and Discussion tools to drive his courses, along with occasional writing activities that use the Turnitin service. The Turnitin location is set up so that students can check their own work and re-submit it there in order to ensure that it meets an appropriate standard of originality. It might take a day or two for Turnitin to give a percent originality score, so submit your work to Turnitin as soon as possible in order to provide it the time required to give good feedback. Students can re-submit as often as they wish UP TO THE DUE DATE but not afterwards. Dr. Giza spends two to three hours in Blackboard the day an assignment is due (or assigned) so that students can use the Blackboard email to interact with him if they have questions or suggestions. He checks back into the course and reviews his Blackboard email about 48 hours later (and periodically) to see if any questions have arisen, but he does not check the course every day, just as a person teaching face-to-face would not be in the lecture hall every day. The course 'meetings' take place at a specified time and on specific weekdays to provide a predictable instructional pattern. Sometimes questions or excerpts of questions from a student submitted via Blackboard email (and responses to their questions) will be forwarded to the entire class, much as answering a question asked in a face-to-face class will provide a benefit to others who hear the question and answer (and may have been wondering the same thing).

A rubric for grading an assignment or discussion is provided with each assignment instruction document, and there is a document (with linked resources) for every assignment in the course, available as a downloadable pdf in the Assignment folder for that activity. To keep individuals on track and collaborating as needed, activities are NOT made available in advance, and they are often modified based upon Dr. Giza's perceptions of student performance or new circumstances

that arise during the period of the course. The list of weekly activities provided in this syllabus is a guide to help students understand the scope of the course, but it will be modified as needed.

On a personal note: This course is meant to help you teach and use technology effectively in the science classroom, as well as playing a leadership role in integrating technology in science education. Your contribution in the development of technology-enriched science classroom lessons is a critical component of the course. We shall work to help you feel comfortable with some key tools and approaches that will be useful in both the classroom and in life. The bottom line is making sure that you understand these concepts and that you come away with a useful experience. Dr. Giza loves teaching, loves science and technology, and hopes that you will get a feeling for why he feels that way during this course. Please contact him if you run into barriers or problems, and we'll work to overcome them together.

Academic Policies

Participants are expected to abide by the UTEP policies concerning academic honesty. Specifically:

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another person's as ones' own. And, collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. Violations will be taken seriously and will be referred to the Dean of Students Office for possible disciplinary action. Students may be suspended or expelled from UTEP for such actions. (Source: http://cetalweb.utep.edu/sun/cetal/events/docs/Academic_Dishonesty.htm).

Use of another person's product (in whole or in part), or your own product from another class, without permission is a violation of this policy. Student work will be checked for plagiarism via a software tool at <http://www.turnitin.com>, and the re-use of extensive passages of text, whether cited or not, constitutes plagiarism. Work turned in will be checked for originality using a plagiarism evaluation tool, and all work must pass this tool's evaluation of writing originality.

Dr. Giza does not accept late work. This course has a series of weekly activities designed to help develop teachers' abilities in terms of science content knowledge and pedagogies. Activities often utilize collaborative work strategies and build one upon each other. Therefore activities are not provided in advance nor are they allowed to be turned in late.

Accommodations for special needs

As per Section 504 of the Vocational Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, if a student needs an accommodation, contact your professor

and we will help you with the appropriate modification, within the procedures established by the University.

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Useful resources

- TPACK.org at <http://tpack.org> (TPACK explained at <http://www.matt-koehler.com/tpack/tpack-explained/>)
- CAST.Org, formerly the Center for Applied Special Technologies, home of Universal Design for Learning and many other useful resources: <http://www.cast.org>.
- The International Society for Technology in Education National Educational Standards for Teachers online at <http://www.iste.org/standards/nets-for-teachers>
- Portable Apps for Windows at <http://www.portableapps.com>.
- Portable Apps for Apple OSX at <http://www.freesmug.org/portableapps> and <http://osxportableapps.sourceforge.net>
- The National Science Education Standards online at: http://www.nap.edu/catalog.php?record_id=4962
- Science NetLinks at <http://sciencenetlinks.com>
- The Digital Library for Earth Science Education at <http://www.dlese.org/library/index.jsp>
- The National Science Digital Library: <http://nsdl.org/>
- Tutorials for Spreadsheets using OpenOffice: http://www.tutorialsforopenoffice.org/category_index/spreadsheet.html
- APA formatting assistance from the OWL at Purdue: <http://owl.english.purdue.edu/owl/resource/560/01/>
- Formatting with styles: Kenyon, C. (2010). *Understanding Styles in Microsoft Word*. Accessed Online on January 4, 2010 from <http://addbalance.com/usersguide/styles.htm>
- Formatting with styles: Krieger, S., & Microsoft.com (2011). *Understanding paragraph, character, list, and table styles, Applies to: Microsoft Office Word 2003*. Excerpted from *Microsoft Office Document Designer* by Stephanie Krieger. Online, accessed January 4, 2010 from <http://office.microsoft.com/en-us/word-help/understanding-paragraph-character-list-and-table-styles-HA001187614.aspx?CTT=1>.
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- Microsoft.com (2011). *Word for new users, Applies to: Microsoft Word 2010. Support / Word / Word 2010 Help and How-to / Getting started with Word*. Online, accessed January 4, 2010 from <http://office.microsoft.com/en-us/word-help/word-for-new-users-HA101631510.aspx?CTT=1>.
- Elizabeth Castro's website. Ms. Castro is one of the most effective educators of HTML coding available, and her Visual Quickstart guides are highly recommended for persons wishing to brush up on their knowledge of HTML. See: <http://www.elizabethcastro.com>
- Davesite, another fine location for brushing up on HTML skills: <http://www.davesite.com/webstation/html/>

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