**University of Arkansas, College of Education and Health Professions**

**Department of Curriculum and Instruction**

**1. Program Affiliation:** Career and Technical Education: Technology and Engineering

Education

**1.1 Course Number and Title:** TEED 3303: The Technologies of Energy and Movement:

Energy, Power, and Transportation

**Prerequisites:** TEED 1103 The Nature of Technology

**Meets:** T/TH 12:30-1:45pm, Peabody Hall 317

**1.2 Instructor:** Vinson Carter, Ph.D.

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575-3076

314 Peabody Hall

Office Hours:

Tuesday/Thursday – 2:00-3:30pm

Friday - By Appointment

**1.3 Textbooks and/or Supplementary Materials**

Required Text:

International Technology and Engineering Education Association. (2000). *Standards for*

*technological literacy: Content for the study of technology*. Reston, VA: Author.

This book can be downloaded for free as a PDF at: <http://www.iteaconnect.org/TAA/PDFs/xstnd.pdf>

In addition to the University library, guest speakers, and journal articles distributed by the professor, the following reference materials will be used extensively:

Litowitz, L. S. & Brown, R. A. (2007). *Energy, power, and transportation.* Tinley Park, IL:

Goodheart-Wilcox.

National Academy of Engineering. (2002). *Technically speaking: Why all*

*Americans need to know more about technology*. Washington, DC: Author.

**2. Course Description/Justification**

**2.1 Catalog Description:** Conceptual foundations and methodologies for teaching energy, power, and transportation technologies at the secondary level.

**2.2 Relationship to Knowledge Base:** This course supports the “Specialty Studies” component of the Scholar-Practitioner model by providing the teacher education candidate with an in-depth study of energy, power and transportation systems. The course includes an intense overview of the history, science, methods, and theories of energy, power and transportation. The course will also provide and in-depth examination of curriculum that has been developed in this area as well as the procedures for developing new curriculum for the secondary classroom.

**3. Goals and Objectives**

**3.1 Goals**

This course is designed to provide the candidate with a foundational understanding of energy, power, and transportation technologies and instructional strategies for teaching these subjects.

All candidates pursuing degrees in the College of Education and Health Professions are expected to apply the principles of the conceptual framework as *Scholar Practitioners.* The scholar practitioner reflects a professional who is knowledgeable about subject matter and pedagogy; skillful in teaching and managing classrooms and schools; caring about students, families, school staff and the community; and constantly inquiring to better the profession and increase the success of students, schools and the community. The scholar practitioner is **knowledgeable, skillful, caring and inquiring** and is defined by the following tenets:

1. One who accesses, uses, or generates knowledge

2. One who plans, implements, and models best practices

3. One who understands, respects, and values diversity

4. One who is a developing professional and a lifelong learner

5. One who communicates, cooperates, and collaborates with others

6. One who makes decisions based upon ethical standards and professional criteria

7. One who is knowledgeable about teachers and teaching, learners and learning, and

schools and schooling.

**Technology:** ‎As with all teacher preparation coursework, students are expected to demonstrate ‎technological competence in this course. This technological competence will be ‎demonstrated through the use of the appropriate technological hardware and software as well as other web-based applications. ‎Scholar-practitioners will utilize technology that enhances the instructional process during ‎the completion on this course.

**3.2. Objectives**

Upon the completion of this course, students will be able to:

3.2.1. Demonstrate the ability to describe the development and functionality of

current energy systems and technologies;

3.2.2. Understand and use the systems model and describe how it applies to

energy, power, and transportation technology;

3.2.3. Demonstrate an understanding of the historical progression of energy

usage and the technologies of power transmission

3.2.4. Understand and describe the impacts of energy usage, and modern

transportation systems technology on society

3.2.5. Demonstrate the ability to teach basic laboratory units and lessons related

to energy, power, and transportation

3.2.6. Describe the early energy/power/transportation systems and how they

influenced the development of more modern systems

3.2.7. Differentiate between sources of energy, their positive and negative

environmental results and costs

3.2.8. Demonstrate a thorough knowledge and the ability to use information

related to the various transportation and vehicular systems to develop engaging instructional units

3.2.9. Demonstrate the ability to describe and utilize currently available

Secondary curricula related to energy, power and transportation

3.2.10. Demonstrate the ability to develop standards-based curricula for energy,

power, and transportation for the secondary level

3.2.11. Demonstrate the ability to incorporate the various instructional methods

and strategies that are used to effectively teach energy, power, and

transportation to all students at the secondary-level.

**4. Student Activities and Experiences**

**4.1. Assignments/Tasks**

Grades for each student will be based on the following assignments:

4.1.1. Daily and weekly assignments (25 points)

Students will participate in ongoing daily and in-class design and engineering activities, assignments, readings, and discussion.

4.1.2. Curriculum Development/Delivery (30 points)

Each student will develop and deliver two lessons/laboratory experiments related to energy, power, and transportation technologies throughout the course of the semester

4.1.3. Laboratory Design Challenges (25 points)

Throughout the semester, students will work in design teams to use tools, techniques, and materials to solve technical problems/challenges associated with energy, power, and transportation systems.

4.1.4. Midterm and Final (20 points)

**5. Content Outline**

**5.1. Introduction to energy, power, and transportation**

1. Facts, concepts, principles, opinions, and myths
2. What is energy
3. What is power
4. History and early systems
5. The Development of modern systems
6. Major paradigm shifts
7. Impacts of technological proliferation
8. Energy consumption vs. transportation freedom
9. Terminology
   1. Energy systems
   2. Rates
   3. Distribution
   4. Conversion devices and systems

**5.2. Sources of energy**

Renewable

Fuels and power systems

Non-renewable

Fuels and power systems

Alternative

Fuels and power systems

1. Hydro-electric
2. Solar – indirect and direct
3. Wind
4. Geothermal
5. Bio-Mass

Sustainable development

**5.3. Energy systems**

1. Components of all energy and power systems
2. Mechanical Systems
3. Terminology and history
4. Uses and abuses
5. Proprietary systems
6. Equipment
7. Fuels
8. Advantages and disadvantages
9. The Future
10. Electrical Systems
11. Terminology and history
12. Uses and abuses
13. Proprietary systems
14. Direct current
15. Alternating Current
16. Circuitry and equipment
17. Fuels
18. Advantages and disadvantages
19. The Future
20. Fluid Systems
21. Terminology and history
22. Uses and abuses
23. Proprietary systems
24. Fuels
25. Advantages and disadvantages
26. The future
27. Energy policy and civic markets/consumers
28. End-use analysis
29. Social and environmental costs
    * + - 1. Pollution
          2. Recycling

Reuse

Conservation

1. Social pressure and hypocrisy
2. Risk assessment
3. Energy planning

f. The energy in transportation

**5.4. Transportation systems**

1. Land systems
   * 1. Vehicles
     2. Specifications and proprietary systems
     3. Power plants
     4. Advantages and concerns
     5. Past and future
2. Air systems
   * 1. Vehicles
     2. Specifications and proprietary systems
     3. Power plants
     4. Advantages and concerns
     5. Past and future
3. Water systems
   * 1. Vehicles
     2. Specifications and proprietary systems
     3. Power plants
     4. Advantages and concerns
     5. Past and future
4. Space systems
   * 1. Vehicles
     2. Specifications and proprietary systems
     3. Power plants
     4. Advantages and concerns
     5. Past and future
5. Pipeline systems

**5.5 Vehicular systems**

1. Propulsion
2. Guidance
3. Suspension
4. Structure
5. Support

**5.6 Energy, power and transportation curriculum**

1. Pre-engineering curricula
2. Modular programs
3. Principles of technology
4. The role of the Standards for Technological Literacy
5. Development of energy, power and transportation curricula

**6. Evaluation Policies**

**6.1. The following scale will be used to determine the final grade in the course:**

A = 92% - 100%

B = 82% - 91%

C = 72% - 81%

D = 60% - 71%

F = Below 60%

**7. Syllabus Change**

The Instructor reserves the right to make changes as necessary to this syllabus. If changes are made, advance notification will be given to the class.

**8. Academic Policies**

**8.1 Accommodations**

Students with disabilities requesting reasonable accommodations must first register with the Center for Education Access (CEA). The CEA is located in the Arkansas Union, Room 104, and on the web at http://cea.uark.edu/. The CEA provides documentation to students with disabilities who must then provide this documentation to their course instructors. Students with disabilities should notify their course instructors of their need for reasonable accommodations in a timely manner to ensure sufficient time to arrange reasonable accommodation implementation and effectiveness. A typical time frame for arranging reasonable accommodations for students who are registered with the CEA is approximately one to two weeks.

**8.2 Academic Integrity**

The application of the University of Arkansas Academic Integrity Policy will be fully adhered to in this course. Grades and degrees earned by dishonest means devalue those earned by all students; therefore, it is important that students are aware of the University of Arkansas Academic Integrity Policy. Academic dishonesty involves acts, which may subvert or compromise the integrity of the educational process.

"As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals though programs of student and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail."

"Each University of Arkansas student is required to be familiar with and abide by the university's Academic Integrity Policy' which may be found on the UA website. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor."

Please review the description of the Academic Integrity Policy is located at:

<http://provost.uark.edu/245.php>

Please review the description Academic Integrity Sanction Rubric is located at:

<http://provost.uark.edu/246.php>

**8.3 Inclement Weather**

For information regarding whether the university is closed or an inclement weather day is declared check the UA website and sign up for the RazALERT Emergency Notification System at <http://emergency.uark.edu/16735.php>.

**8.4 Instructor Policies**

**Attendance**

This course is reserved for candidates preparing to become professional teachers. Subsequently, the ethics and responsibilities of professional teachers will be expected of all participants. Candidates must attend class to receive the maximum benefit and to avoid leaving their professional responsibilities in the hands of classmates. Candidates will be allowed two “sick” days regardless if excused or unexcused, if needed. Additional absences will result in the lowering of one letter grade per absence in your final grade. Furthermore, two occasions of coming late to class or leaving early will be counted as one absence.

Candidates are expected to arrive early, stay focused and attentive during the class, and submit all required materials prior to the due date. Late work will not be accepted for full-credit.

**Professionalism**

All candidates are to complete their own work during the semester. Although candidates are allowed to share ideas and learn from one another throughout the semester, students are not allowed to copy another person’s work. All assignments must be original and completed individually. All citations must be documented using the 6th edition of the APA manual (<http://www.apastyle.org/>, <http://psychology.vanguard.edu/faculty/douglas-degelman/apa-style/>)

Candidates are required to maintain professional decorum during class. Cell phones and other electronic devices must be turned off and out of sight during class. Inappropriate and disruptive classroom behavior (including the use of cell phones, iPads, laptops, and other electronic devices) will not be tolerated, and may result in the loss of points from daily and weekly assignments.