1. Eastern Kentucky University
   Department of Curriculum and Instruction
   EMG 807:
   Credit Hours: 3
   Instructor: J. Scott Townsend, Ph.D.

2. Catalogue Course Description:
   Independent work, workshops, special topics, or seminars. May be retaken under different subtitles.

   Special Topic:
   Energy as a Unifying Concept in Science Teaching
   This special topics course will focus on the major and integral concepts of energy and their importance across science content and science teaching.

3. Text:
   Stop Faking It: Finally Understanding Science So You Can Teach It: Energy (NSTA Press)
   NEED Project Workshop and Teacher Resource Packet (purchased from workshop administrator – approximately $35)

4. Student Learning Outcomes:

   The inservice/preservice teacher will be able to:
   - Connect age-appropriate content knowledge in middle school science with appropriate pedagogical techniques
   - Connect ideas of energy concepts across all areas of science teaching
   - Synthesize his/her own ideas about energy, the types of energy, transfer of energy, and how such concepts relate to the learner
   - Further develop his/her own teacher content knowledge of basic energy concepts to improve his/her own conceptual understanding and that of his/her students
   - Develop a list of important concepts in his/her teaching content and apply how the grand unifying theory of energy as a concept to improve students broader conceptual understanding of science
   - Understand basics of inquiry, the 5E Learning Cycle, discrepant events and other pedagogical techniques essential to conceptual understanding in the science classroom
   - Synthesize science content and pedagogical content knowledge using the following topics to create an more scientifically-informed conceptual understanding of energy:
     - Types of Energy
     - Energy in Everyday Language
     - Energy and Work
     - Transfer and Conservation of Energy
     - Cycles of Energy
     - Energy as a Unifying Factor in the Life Sciences
     - Heat, Work, and Energy Efficiency in Systems
     - Global and Socioscientific Issues Related to Modern Situations and the Environment
### Evaluation Methods:

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<th>ITEM</th>
<th>REQUIREMENTS</th>
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| 1.   | Classroom Attendance and Active Participation (6*25 points) = **150 points**  
      | June 24, July 1, July 8, July 15, July 22, July 29 |
| 2.   | Weekly PD Energy Video Modules (Questions/Reflections) (9*30 points) = **270 points**  
      | Upload to Bb |
| 3.   | Weekly Content Quiz - Text, Articles, Videos, Homework: (4*30 pts) = **120 points**  
      | Post-Classes 1, 2, 3, and 5 |
| 4.   | Content Quiz for Class 4 (the week following class): **60 Points** |
| 5.   | Energy Puffs Energy Source Cereal Box Design: **90 points**  
      | Share-a-Thon during Class #5 |
| 6.   | Energy Across the Curriculum Planning Project = **120 points**  
      | (alternative final projects can be negotiated for this based on the needs of the teacher) |
| 7.   | Course Post-Test: (35 questions*5 pts. each) = **140 points**  
      | 3 points for MC Response and 2 Points for Short Answer Elaboration |

**950 Points Total for the Course**

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Video notes should be uploaded to Bb by 10:00 AM on Thursday.
Bb quizzes should be completed by 9:00 PM on Thursday.
6. **Student’s Progress:**
   Student’s grades are posted in Blackboard and are updated as soon as the grade has been posted. Students can check their grade at any time. Also, the student is welcome to make an appointment to meet with the instructor at any time.

7. **Attendance Policy:**
   Due to the limited number of face-to-face meetings. Absences will need to be limited to one and should be arranged for a make-up with the instructor, if possible. Two absences will result in failure of the course.

8. **Last Date to Drop Classes:**
   Midterm

9. **Disability Statement:**
   If you are registered with the Office of Services for Individuals with Disabilities, please make an appointment with the course instructor to discuss any academic accommodations you need. If you need academic accommodations and are not registered with the Office of Services for Individuals with Disabilities, please contact the Office on the third floor of the Student Services Building, by email at diserv@eku.edu or by telephone at (859)622-2933 V/TDD. Upon individual request, this syllabus can be made available in alternative forms.

10. **Academic Integrity Statement:**
    Students are advised that EKU’s Academic Integrity policy will strictly be enforced in this course. The Academic Integrity policy is available at www.academicintegrity.eku.edu. Question regarding the policy may be directed to the Office of Academic Integrity.

11. **Course Requirements:**
    This is a short, intensive course. Participants are expected to participate in both the pretests, the posttests, all class meetings, and all online modules.

**Grading Scale:**

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>92%-100%</td>
</tr>
<tr>
<td>B</td>
<td>83%-91%</td>
</tr>
<tr>
<td>C</td>
<td>74%-82%</td>
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<tr>
<td>D</td>
<td>65%-73%</td>
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<tr>
<td>F</td>
<td>0%-64%</td>
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12. Course Outline:

Class #1 6/24/11
Concept of Energy and Everyday Language
Types of Energy
Historical (Epistemological) Concepts of Energy
Energy and Work

Homework:
PD Videos 1 (What is Energy?) & 2 (Force and Work)
Complete Video Questions from videos 1 & 2
Read Chapter 1 and Ch. from midpoint of pg 25 - midpoint of pg 32
EXTRA READING: Energy Transformations
Take online Bb quiz

Due by Class 2:
Upload video notes to Bb by Thursday
Take Bb quiz by Thursday

Class #2 7/1/11
Transformation and Conservation of Energy
Potential and Kinetic Energy
Energy Transfer
Energy Cycles (begin, sustain, decay)

Homework:
PD Videos 3 (Transfer and Conservation of Energy) & 4 (Energy in Cycles)
Complete video questions for videos 3 & 4
Read Ch. 2 pages 17-midpoint pg. 25 and midpoint pg 32 – pg 40
Additional: Read Energy Content Review Document (pg 23 – 36)
Take online Bb quiz

Due by Class 3:
Upload video notes (3 & 4) by Thursday
Take Bb quiz by Thursday
Class # 3  7/8/11
Potential Chemical Energy
Energy Conversion in the Life Sciences
Energy Flow/Chains/Efficiency Throughout the Community
Energy in the Body and in Ecosystems

Homework:
PD posted video #5 (Energy in Food) & #5a (Energy Flow in Communities)
Complete video questions for video #5 and related video (upload via Bb)
*Read provided pages from Essentials of Ecology book (provided hard copy and/or via Bb scan)
Take Bb Quiz

Due by Class 4:
Upload video notes by Thursday (#5 and additional video)
Take Bb quiz by Thursday

→ Don’t forget to be working on your Energy Puffs cereal box! It is due Class 5.

Class # 4  7/15/10
Energy and Systems
Energy Transfer in Systems (from high concentration of energy to lower concentration of energy)
Equilibrium of Systems Regarding Energy

Homework:
PD Videos #6 (Energy in Systems) & #7 (Heat, Work, and Efficiency)
Two sets of video questions (upload to Bb)
Readings Chapter 3
   Read all of Chapters 3, 4, and 5
Read posted reading Temperature, Heat, and Sorting Things Out (via Bb and/or distributed in class)

Due by Class 5:
Upload video notes by Thursday (#6 & #7)
Take Bb quiz by Thursday (longer quiz than usual—worth double points)

→ Energy Puffs Share-a-Thon
   ○ Be sure to have your cereal box ready for presentation for Class #5
Class # 5  7/22/11
Energy and Implications for individuals and Society
Implications Regarding Population and Energy (Population Connection PD Mini-Workshop)
Socio-Scientific Issues and (Respectful) Argumentation

Energy Puffs Share-a-Thon

Homework:
Video #8 (Understanding Energy)
One set of video questions (upload to Bb)
Readings: Chapter 6
Additional Reading: Cognitive Resources for Understanding Energy (posted and/or hardcopy)

Due in Class 6:
Upload video notes for #8 by Thursday (to Bb)
Take Bb quiz by Thursday

Class # 6  7/29/11
6-Hour Required Professional Development Workshop -- 9:00-4:00
NEED Project

Due After Class #6:

➢ Posttest (7/29/11 at 4:30 or by appointment the following week)

➢ Energy Across the Curriculum Planning Project
  ○ Individual or group
  ○ Hardcopy or CD due at end of Class #6
  ○ Internet project due by 11:59 PM Sunday night.
  ○ Please discuss other useful project options with Dr. Townsend

13. Additional Requirements:
Participants will need to have access to the website, www.learner.org to access the inquiry videos. The nine videos in the series will be an important part of this course. There will be a detailed explanation for this on Blackboard.

Official E-mail: An official EKU e-mail is established for each registered student, faculty, and staff member. All university communications sent via e-mail will be sent to this EKU e-mail address. Please ensure that you are able to use Bb effectively and communicate through Bb as well.