Course Description:
This course covers significant physical science principles, generalizations, and understandings with relation to their use with children in elementary and middle school. Appropriate learning activities, experiments, field trips, text and reference materials, technological applications, and evaluations will be a part of this course.

Course Outcomes:

- Know, understand and apply basic concepts and principles related to physical science.
- Relate an understanding of physical science to current societal issues.
- Use scientific and engineering practices to learn about natural phenomena
- Design and conduct investigations on topics related to physical science using appropriate methodology and technology.
Apply mathematics in the collection, analysis and interpretation of data.
Communicate findings using appropriate technologies.
Learn from various sources (professional journals, textbooks, the Internet and the community) and reconstruct previously learned knowledge.
Develop a more positive and enthusiastic attitude about physical science.

Course Philosophy:

The class involves discussion of major physical science concepts, principles and generalizations interspersed with group activities. The Next Generation Science Standards (NGSS) specify that science instruction be centered on performance expectations which combine relevant practice of science or engineering, with core disciplinary ideas and crosscutting concepts, appropriate for students of the designated grade level. In order for teachers to use this approach in their own teaching, they must become thoroughly comfortable with it through their own learning.

Various subject areas such as math, language, and social studies may also be integrated with the teaching/learning of science. Science is perhaps the best subject for the development of an integrated curriculum. Teachers must be able to incorporate this in their own practice.

Required Text(s):
The required textbooks are:
  Wilmington, MA: Great Source Education Group.

Additional Recommended References:
Abruscato, Joseph. Teaching Children Science. Allyn and Bacon.
AIMS, Primarily Physics—Investigations in Sound, Light and Heat Energy. AIMS Education Foundation
Center for Science Education, Michigan Operation Physics. Sound, Western Michigan University
CESI, Physical Science for Elementary and Middle School, Council for Elementary Science International
FOSS, Balance and Motion, Delta Education
Lowery, Lawrence, The Everyday Science Source Book-Ideas for Teaching Elementary and Middle School, Dale Seymour Publications
Policies:
Because each class meeting is almost three hours long, and so much material is covered in each meeting, it is essential that you attend each class to do well in the course. Attendance will be taken at the beginning of class. Each class session is worth 10 points. Absences will be excused under certain circumstances such as illness or death in the family when the student provides the instructor with evidence of such emergencies such as notes from doctor or other relevant official. Absentees are responsible for: (1) getting any handouts passed out during the missed class, (2) any in-class announcements, (3) changes in syllabus, and (4) material discussed in class. There will be no make-up of activities missed. All Class sessions designed to be experienced on-line will require dedicated time commitment equal to that of face-to-face class meeting. Log-in and depth of submitted response will evidence your “attendance”.

Please arrive to class on time. Class announcements are given at the beginning of class, which you will miss if arriving late. Late arrivals are also disruptive to everyone in class. PLEASE TURN OFF YOUR CELL PHONES BEFORE ENTERING THE CLASS AND STORE THEM AWAY.
Technology Access:
Course assignments must be word-processed. **Class communication will utilize WSU’s student user ID.** Unless you regularly use your WSU user ID as your email address, you will miss any communication sent to you by using any other email address. You may set up e-mail forwarding through **Pipeline.** All course materials (syllabus, lecture presentations and assignment guidelines and grading rubrics) and quizzes presented through **Respondus-Lock Down Browser** will be available in the course’s Blackboard site at: [http://blackboard.wayne.edu](http://blackboard.wayne.edu)
It is the students’ responsibility to learn how to use email and Blackboard. Assistance is available in **Blackboard > Help** and also **Student Resources** tabs, and through the **CI & T Website.**

Plagiarism
Plagiarism includes copying material (any more than 5 consecutive words) from outside texts or presenting outside information as if it were your own by not crediting authors through citations. It can be deliberate or unintended. **If you are in doubt about the use of a source, cite it.** Students caught plagiarizing information from other sources will receive a failing grade in the course. University policy states that students can be subject to multiple sanctions, from reprimand to expulsion as a consequence of academic dishonesty. **To enforce this policy, all outside references must be submitted with assignments.**

Attention Students with Disabilities:
If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, SDS staff will be glad to meet with you privately during office hours to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University. See [http://studentdisability.wayne.edu/](http://studentdisability.wayne.edu/).

Religious Observance Policy:
Because of the extraordinary variety of religious affiliations represented in the University student body and staff, the Wayne State University calendar makes no provision for religious holidays. It is University policy, however, to respect the faith and religious obligations of the individual. Students who find that their classes or examinations involve conflicts with their religious observances are expected to notify their instructors well in advance so that alternative arrangements may be worked out.

NOTE: Check Blackboard and WSU email regularly.

Grading Policies:
The final grade is calculated from the various assignment grades, class attendance and participation in activities, and the research project. **These categories will be weighted by value.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Attendance, Activities and Participation</td>
<td>20 %</td>
</tr>
<tr>
<td>Quizzes &amp; Final Exam</td>
<td>30 %</td>
</tr>
<tr>
<td>Assignments</td>
<td>30 %</td>
</tr>
<tr>
<td>Research Project</td>
<td>20 %</td>
</tr>
<tr>
<td>Design</td>
<td>5 %</td>
</tr>
<tr>
<td>Presentation</td>
<td>5 %</td>
</tr>
<tr>
<td>Final Report</td>
<td>10 %</td>
</tr>
</tbody>
</table>
General Note
The College of Education Faculty members strive to implement assessment measures that reflect a variety of strategies in order to evaluate a students’ performance in a course. For undergraduates C grades will be awarded for satisfactory work that satisfies all course requirements. B grades will be awarded for very good work and A grades will be reserved for outstanding performance. Please note that there is a distribution of grades from A – F within the College of Education and that plus and minus is recorded and distinguish distinct grade point averages.

Undergraduate Grades will be assigned as follows:

<table>
<thead>
<tr>
<th>Grade Range</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100 %</td>
<td>A</td>
</tr>
<tr>
<td>90-92 %</td>
<td>A-</td>
</tr>
<tr>
<td>87-89 %</td>
<td>B+</td>
</tr>
<tr>
<td>83-86 %</td>
<td>B</td>
</tr>
<tr>
<td>80-82 %</td>
<td>B-</td>
</tr>
<tr>
<td>77-79 %</td>
<td>C+</td>
</tr>
<tr>
<td>73-76 %</td>
<td>C</td>
</tr>
<tr>
<td>70-72 %</td>
<td>C-</td>
</tr>
<tr>
<td>67-69 %</td>
<td>D+</td>
</tr>
<tr>
<td>63-66 %</td>
<td>D</td>
</tr>
<tr>
<td>60-62 %</td>
<td>D-</td>
</tr>
<tr>
<td>Less than 60%</td>
<td>F</td>
</tr>
</tbody>
</table>

Graduate Grades will be assigned as follows:

<table>
<thead>
<tr>
<th>Grade Range</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 – 100%</td>
<td>A</td>
</tr>
<tr>
<td>90 - 92%</td>
<td>A-</td>
</tr>
<tr>
<td>87 - 89%</td>
<td>B+</td>
</tr>
<tr>
<td>83 - 86%</td>
<td>B</td>
</tr>
<tr>
<td>80 - 82%</td>
<td>B-</td>
</tr>
<tr>
<td>77 - 79%</td>
<td>C+</td>
</tr>
<tr>
<td>73 - 76%</td>
<td>C</td>
</tr>
<tr>
<td>Less than 73%</td>
<td>F</td>
</tr>
</tbody>
</table>

Things to keep in mind:

- The instructor will provide criteria and a grading rubric for each assignment. These criteria are located under “Assignments” in the course’s Blackboard site and should be used as guidelines for what the instructor expects in each assignment.

- Assignments may be submitted electronically by the end-of-day on the date the assignment is due or hard copy turned on the due date during class.

- **Late assignments will decrease in point value by 5% of the allocated points for each day the assignment is late.**

- To meet professional quality and presentation standards required of practicing teachers, assignments will be graded on clarity of ideas, grammar, spelling, and adequate word choice. **Assignments must be typed on a word-processor. Submissions must be accessible in Blackboard (MS-Office compatible, or .pdf file)**

Regarding a Grade of Incomplete:
All students are expected to complete the course by the end of the semester. If during the semester, you feel that you cannot handle the amount of work required for this course, please drop the class.
A grade of incomplete “I” will be given only to a student who is doing well in the course and who, due to unforeseen circumstances such as a serious accident, is unable to complete all the course assignments. Under these circumstances, the student must make arrangements with the instructor, **before the last class meeting**, in order to fill out a “contract” in which the student’s responsibilities are stipulated and agreed upon.
A grade of incomplete will not be given to a student who at the time of the request is failing the course. Incompletes will revert to a failing grade after one calendar year, there will be no extensions.

1. Students who do not complete course requirements, or do not withdraw appropriately (in timely ways), will receive a failing grade.
2. Students who withdraw within the scheduled dates of the term will receive one of these notations: -WP Withdrawal with a passing grade earned to date, -WF Withdrawal with a failing grade earned to date, -WN Withdrawal never attended, or no graded work to date
3. Students must submit their withdrawal request on-line through Pipeline. The instructor must approve the withdrawal request before it becomes final, and students should continue to attend class until they receive notification via email that the withdrawal has been approved.

Note: Add/ Drop Policy:
Students must add classes no later than the end of the first week of classes. This includes online classes. Students may continue to drop classes (with full tuition cancellation) through the first two weeks of the term.
The last day to withdraw is the end of the 10th full week of classes.
This means the course withdrawal deadline is Saturday, March 22, 2014.

Academic Success:
The Academic Success Center in the Adamany Undergraduate Library provides tutoring by appointment at no cost as well as training in areas such as time management, study and testing skills.
Please visit the Success center if you begin having difficulty in any of the courses you are taking.

COURSE ASSIGNMENTS:

**Detailed guidelines and a grading rubric for each assignment are located in the course’s Blackboard site under “Assignments.”

1. **Scientific Method Inquiry Project & Presentation**
   In this course, you must design and conduct an experiment to test a selected hypothesis (List of suggested topics will be provided). You are to use accepted scientific methods and demonstrate science process skills. The topic you choose to investigate must be congruent with any physical science concept in Michigan Curriculum Framework. You will prepare a power point presentation of your findings.
   
   **The project will have 3 parts:**
   1. **Project Design** should include the hypothesis that you will test, the variables (identified and defined), and the materials that will be needed to conduct the experiment.
   2. **Power Point Presentation** - you will design a 10-minute Power Point Presentation on your project. Please refer to the guidelines for the Power Point Presentation. Everyone will present their project, symposium style, and rotate around to peer-review other presentations.
   3. **Final Project Report** The final report is a detailed description of every aspect of your research project. Please refer to the guidelines for your research project report.

2. **Real World Questions**
   This assignment is comprised of 4 “real-world” questions that target specific physical science benchmarks found within the Science Content Grade Level Expectations. This assignment has two
purposes: (1) it will help you develop understanding of various science topics; (2) it will help you practice formulating clear and thorough explanations for others. It is important that teachers not only know the subject they teach, but that they also can effectively communicate important ideas to their students. This assignment requires the development of both of these skills.

3. **Test and Quizzes**
   There will be Three Quizzes in this course. These quizzes are a combination of multiple-choice, short answer, and essay items. The material for each examination will include items from class activities, handouts, and articles assigned for reading. The 2nd and 3rd quizzes will cover only the concepts and activities presented after the first exam. **A study guide will be available before each exam.**

4. **Science Model**
   You must develop a deep understanding of science and engineering practices. Choose a topic or major concept covered in class and develop a model that can be used to help explain the topic/concept. **Refer to the guidelines and grading rubric provided for the assignment.**

5. **Choice Assignments**
   Choose **ONE** of the assignments listed below:
   - **Attend a Conference or Workshop**
     See the rubric on blackboard for submitting a report related to this experience.
   - **Annotated Webliography**
     Create an Annotated Webliography of 10 or more interactive physical science web resources. Each resource must be aligned with a physical science Grade Level Content Expectation. The rubric for the Webliography is posted on Blackboard.
     **Concept Map**
     Choose a topic within life science and use the software *Inspiration* to draw a concept map that shows the interrelationships among its various concepts. **Please refer to the guidelines and grading rubric provided for the assignment.**
   - **Jeopardy Quiz**
     To demonstrate your understanding of the concepts for this course you are to create a Jeopardy Game using physical science concepts or topics. The directions and rubric for creating the game is posted on Blackboard. You are to select 5 concepts as categories.

6. **On-Line Sessions:** Two class sessions will be presented as on-line work sessions. You will log into blackboard, access the web-links on the designated topics, and then complete and submit the response assignment. There will be **no on-campus meetings for these 2 sessions**; you may complete the assignment from whenever and wherever you have access to Blackboard.

7. **Course Portfolio File:** An organization of all the materials in the Blackboard site into an electronic Course Portfolio File Resource. May be submitted as a CD-ROM or flash drive, must be clearly labeled with student’s name. **Refer to guidelines and grading rubric provided.**

*You will be informed of changes to the scheduled topics and /or due dates should the necessity arise.*
ALL work must be submitted before 7:45 p.m., Thursday, April 18 to be considered for grading. See Pipeline [http://www.pipeline.wayne.edu] for other important dates and deadlines.

Class Schedule and Topics:

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics Considered</th>
</tr>
</thead>
</table>
| January 9  | Orientation --Assignments  
Science & Engineering Practices  
Grade Level Content Expectations (GLEC’s)  
Next Generation Science Standards (NGSS)  
Nature of Science  
Related text reading –Pages 068, 001—019 |
| January 16 | Matter & Its Properties:  
Motion of Molecules  
Structure of Atoms  
The Periodic Table of Elements  
Phases/States of Matter  
Due: Information Page (submit in Blackboard)  
Related text reading –Pages 250-274 |
| January 23 | Models—Atoms and Molecules  
Law of Conservation of Matter  
Chemical Formulas  
Due: Inquiry Project Design |
| January 30 | Elements, Ions, Compounds and Mixtures  
Acids and Bases  
Chemical and Physical Changes |
| February 6 | Matter and Its Properties  
Quiz #1 |
| February 13| Forces and Motion—  
Gravity/Friction/Magnetic  
Newton’s Laws  
Related text reading –Pages 274-298 |
| February 20| Balanced Forces  
Simple Machines  
Related text reading –Pages 322-331  
Due: Scientific Model |
| February 27| Forces, Motion, and Simple Machines  
Quiz #2 |
| March 6    | On-Line Session: Energy  
BBC Kids:  
[http://www.bbc.co.uk/schools/ks3bitesize/science/energy_electricity_forces/energy_transfer_storage/revise1.shtml]  
Due: Response to On-line Questions |
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 13</td>
<td><strong>Spring Break- No Class Meeting</strong></td>
<td></td>
</tr>
<tr>
<td>March 27</td>
<td><strong>On-Line Session: Forms of Energy-Thermal Energy</strong></td>
<td><em>NSTA SciPacks and Science Objects- Thermal Energy</em></td>
</tr>
<tr>
<td>April 3</td>
<td>Forms of Energy—Waves &amp; Particles: Light and Color, Sound</td>
<td>Due: Choice Assignment-Science Jeopardy Game, Conference Report, Webliography, Concept Map</td>
</tr>
<tr>
<td>April 10</td>
<td>Forms of Energy—Electricity and Magnetism</td>
<td>Due: Real World Questions</td>
</tr>
<tr>
<td>April 17</td>
<td>Inquiry Project Presentation Sharing</td>
<td>Due: Inquiry Project Final Report, Power Point Presentation, Course Portfolio File</td>
</tr>
<tr>
<td>April 24</td>
<td><strong>Forms of Energy</strong></td>
<td>Final Exam (Quiz # 3)</td>
</tr>
</tbody>
</table>

**MTTC Tests - Michigan Test for Teacher Certification**

In the state of Michigan, a pre-service teacher must take and pass a test in each of the content areas in which s/he plans to be certified. At Wayne State University, passing the basic MTTC test is a requirement to the student teaching field experience. As a result, it is imperative that pre-service teachers prepare for the tests. There are a number of resources available to teachers to help them prepare for the tests. First, students should check the MTTC Tests website: [http://www.mttc.nesinc.com/index.asp](http://www.mttc.nesinc.com/index.asp) to find out test schedules, how to register for the tests, test objectives and other pertinent information. Second, students must study for the tests. Even if you have a major in a subject area the chances are you have forgotten most of what you once learned. Therefore, you need to go over the information for a fresh understanding of the concepts in order to pass the tests. The tests usually cover the basic information in a content area and going over a freshman biology, chemistry, or physics textbook and relearning the concepts related to that specific test’s objectives will maximize the chances of succeeding. If you do not have access to such textbooks, you might want to search for some free textbooks online. Below are a few links to online textbooks.

- Biology [http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookTOC.html](http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookTOC.html)

In addition to reviewing the material from a basic textbook, study guides are excellent resources to prepare for these tests. The following websites have study guides that students may purchase at an affordable price:
• Mo-Media - [http://www.mo-media.com/mttc/] - have study guides in all areas including Integrated Science.
• Amazon also has a variety of study guides -
  [http://www.amazon.com/s/?ie=UTF8&keywords=mttc+study+guides&tag=googydr-20&index=aps&hvadid=1147468841&ref=pd_sl_9caca812mo_b] -

Remember the key passing the tests is preparation. Discuss your plan for scheduling the MTTC with your advisor.

**APA References**  
WSU Library: Citation Style Guides: [http://guides.lib.wayne.edu/referencetools]
Purdue Online Writing Lab: [http://owlenglish.purdue.edu/owl/resource/560/01/]

**Resources and References**

The following list of science activity books, journals, and other resources will be useful to you as a teacher. Add to the list as you encounter additional ones and start a file for your future use. You will find it very useful once you become a teacher.

**Science Education Journals:**
- *Science and Children*
- *Science Scope*
- *Science Teacher*
- *Teaching K-8*
- *Creative Classroom*
- *Wonder Science*

**Community Resources:**

Detroit Zoo. 8450 W 10th Mile, Royal Oak (at I696 and Woodward). Tel. (810) 398-0900. [http://www.detroitzoo.org/]


Michigan Department of Natural Resources. [http://www.michigan.gov/dnr/]

Michigan Math and Science Centers Network [http://www.mimathandscience.org/]

1- (313) 577- 8400

**Science organizations** Consider becoming a member of:
- Michigan Science Teachers Association (MSTA) [http://www.msta-mich.org/]
- Metropolitan Detroit Science Teachers Association (MDSTA) [http://www.mdsta.org/]
- National Science Teachers Association (NSTA) [http://www.nsta.org/]

**Books**
Bosak, S. V. (Latest edition). *Science is....* Markham, Ontario: Scholastic Canada, Ltd.


