M437 Teaching Science 5-12  
M550 Practicum in Middle School Science  
S508 Methods of Teaching Science I (UTEP and TtT)  
S518 Advanced Study of the Teaching of Secondary School Science

Spring 2011

Wednesdays 4:00 - 6:45 pm, Hawthorn Hall room 329

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Office Hours: After class or by appointment  Email: KSchoon@iun.edu

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I. COURSE DESCRIPTIONS

IUN Bulletin description: Focus on curriculum decisions teachers make every day. Specifically, students in this course will examine current learning theories and apply those theories to instructional practices at the middle grades and high school. **Prerequisites:** 70% of required science courses and admission to either the IUN Teacher Education Program or UTEP’s Option II Program.

This course is the first of two science methods courses designed for students who plan to teach science in the senior high / junior high / middle school. These two courses will build upon skills learned in earlier courses in the Division of Education's Teacher Education Program. They emphasize the importance of active- and inquiry-based learning. Students will have ample opportunities for using these models as they teach secondary children as part of the accompanying field experience program. Field experiences for these courses will be in the middle grades. Field experiences for the second course, (M446 for undergraduates, S508 for Option II students), will be at the high school level. **S518** is for licensed science teachers.

Course Goals

Students taking M437 / S508 will:
- become creative, effective, reflective, and caring science teachers.  
- realize that teaching science can be fun and rewarding.
II. SCHOOL OF EDUCATION MODELS
M437 / S508 / M550 are based upon a research-based conceptual framework that incorporates outcomes, all of which together are designed to prepare a “Reflective Professional” (for initial certification). The following chart shows the program outcomes of this model and which course objectives apply to each. The asterisk indicates that a portfolio artifact will be assigned to meet that outcome.

<table>
<thead>
<tr>
<th>Reflective Professional Model</th>
<th>Objectives</th>
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<tbody>
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<td>3, 9, 12, 13</td>
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<td>2. Higher Order Thinking Skills *</td>
<td>1, 9</td>
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<tr>
<td>3. Instructional Media / Technology</td>
<td>2, 3, 4, 9</td>
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<td>4. Learning and Development</td>
<td>9, 10, 12</td>
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<tr>
<td>5. School Culture and Context</td>
<td>7, 8, 10</td>
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<tr>
<td>6. Instructional Design and Delivery</td>
<td>1, 2, 3, 5, 6, 9</td>
</tr>
<tr>
<td>7. Classroom Management</td>
<td>9</td>
</tr>
<tr>
<td>8. Assessment and Evaluation</td>
<td>9</td>
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<tr>
<td>9. Professional Development</td>
<td>11, 12</td>
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</tbody>
</table>

III. COURSE OBJECTIVES
Students enrolled in this science methods course will:
1. Show an understanding of the products, processes, and nature of science.
2. Show an awareness of a variety of resources available for science teachers including national and state science periodicals, computer software, and the Internet.
3. Use electronic technology to communicate with others and to prepare teaching materials. Develop teaching lessons in which teachers would use electronic technology to facilitate learning.
4. Evaluate and demonstrate computer software designed for the science classroom.
5. Demonstrate discrepant events appropriate for middle school students.
6. Plan a field trip to a local facility such as a park or museum paying special attention to needs of students with disabilities.
7. Conduct a service learning activity in a non-traditional science teaching activity.
8. Gather and synthesize information about the school where you do your field experience.
9. Write lesson plans appropriate for middle / high school science classes that include:
   • a strategy for dealing with probable student misconceptions.
   • objectives which require higher order thinking skills such as analysis, synthesis, and evaluation.
   • strategies which address classroom management and your students’ various learning styles.
   • a variety of methods of teaching and evaluation including an effective use of questioning skills
   • an effective use of technology, and integration of science with other subjects
   • a correlation with Indiana standards.
   • an assessment plan
10. Make adjustments in plans, as needed, to account for exceptionalities.
11. Join professional organizations of teachers of science. Attend at least one sponsored event.
12. Reflect on the science teaching done and observed.

Initial Program Dispositions
The SOE is committed to the values of academic integrity in teacher preparation. Students are expected to consign themselves to each of the following dispositions throughout this semester in classroom participation, projects, and assessment activities:

1. Attendance, punctuality & professionalism (i.e., actions, appearance)
2. Connect subject to students’ world
3. Align teaching with state & professional standards
4. Prepare and promote active learning
5. Communicate ideas clearly in speech and writing
6. Use of multiple approaches & technology to teach
7. Student-centered management of class time & student behavior
8. Respects students from diverse backgrounds
9. Promote cooperation in class, school, and community
10. Track student progress & adjust teaching to meet needs
11. Willing to receive constructive criticism and suggestions
12. Committed to becoming an effective teacher

IV. MATERIALS


*Standards for Teachers of Science*, Indiana Professional Standards Board: Available on the web at [http://www.state.in.us/psb/standards/teacherindex.html](http://www.state.in.us/psb/standards/teacherindex.html)


A journal article or book on pseudoscience such as *Why People Believe Weird Things*, Michael Shermer, Henry Holt & Co.2002 (any personal or library copy OK)

V. COURSE REQUIREMENTS

Course Expectations

Attendance and participation are very important in this class. Students are expected to attend and participate in all class activities and discussions. This obviously cannot be done when one is absent. Students who cannot attend a class, for whatever reason, should call 980-7766 before class begins and arrange for an alternative assignment. Students who will be late, should also call. Students with two or more unexcused absences, or four or more excused absences, will be asked to withdraw and take the course next year. Students with an unexcused absence on the day of a quiz or demonstration may not make up those assignments.

Assignments are due at the beginning of class periods. Due dates may be altered on account of illness or if arranged in advance. If a student is unable to attend class when an assignment is due, the student must ensure that the assignment is submitted on time (via email, another student, or US mail). In cases of emergencies it should still be submitted within 24 hrs. A written assignment submitted late will have points deducted (usually 5% / school day – 25% / week).

Formal written materials must be typed on a word processor. Word processing features such as enlarged type size [for the title page], bold face [for headings] and justification should be used as appropriate. Papers should be double-spaced with a 1-inch margin. Font size should be about the size used here. Do not use cute or hard-to-read fonts. Papers must have a professional appearance and be grammatically, historically, mathematically, and scientifically correct. Citations must be properly listed. *Indiana Academic Standards* must always be written out. For several assignments a single-spaced file copy is also required.

Redoing assignments: Assignments may be redone if the grade received is a B- or lower and a "Redo Packet" is submitted within one week of the original work being returned. The packet must contain both the original and the revised copies, the original assessment form, and a cover sheet which describes all changes made. Altered materials should be highlighted on the revised copy. (On long assignments, only revised pages need be reprinted). Sections of any assignment not done the first time cannot be redone.
- **If submitted early:** A written assignment may be submitted two weeks early, then redone. If resubmitted on time, only the second evaluation will be recorded.
- **If submitted on time:** A written assignment submitted on time may be redone. The final grade will be an average of the two evaluations, except that no such grade shall be higher than 85%.
Assignments

Assignments that require performances

P-1. Pseudoscience report. Select a form of pseudoscience. Find and read resource materials about it and lead a 5-10 minute discussion about it in class (Objective 1)

P-2. Discrepant event. Demonstrate to the class two discrepant events one discrepant event suitable for use in middle/high school science. Submit by email a description of the events so that they can be disseminated to the other class members. (Objective 9)

P-3. Conference attendance.

1. Download information about two science teacher conferences. Bring hardcopies to class and be prepared to discuss them.

2. Attend two half days at a conference (or two) sponsored or organized by a state or national organization of science teachers or workshops designed for professional development of science teachers. Provide written documentation of your attendance and report (orally) about the experience to the class. It is recommended that this assignment be met by attending HASTI's convention in February. (Objective 11)

P-4. Snowflakes. Create 3 "anatomically-correct" snowflakes; include at least one star-shaped and one hex-shaped design. Laminate or mount them on black or blue paper. (Objective 1)

P-5. Web sites. Demonstrate to the class a useful web site that could be used in middle/high school science teaching. Show to the class an animated or video web site that could be used in showing a science process that would be hard to demonstrate live. (Objectives 2 and 3)

P-6. Micro-teaching assignment. Plan a 25-30 minute inquiry science lesson appropriate to middle/high schools. Write an appropriate lesson plan. Get all equipment necessary and teach it to the class. (Objective 9)

P-7. Student learning report. Create assessment instruments (e.g. pretest and quiz) for two of the three lessons that you taught in the field. (See field experience requirements for lesson-type requirements.) These instruments must measure whether students met each of your objectives. This must include a means to measure students knowledge before you taught the lesson and afterwards. Then write a summary of your effect on student learning. Specific data is needed for this report: The report, due towards the end of the semester, must include:

- an introduction that describes where, when, to whom, and what you taught
- materials for the first lesson
  - lesson plan, warm-up sheet (pre-test -may be called an “Anticipation Guide”), post-test, examples of student work, data on student mastery of each objective, discussion
- materials for the second lesson
  - lesson plan, warm-up sheet (pre-test), post-test, examples of student work, data on student mastery of each objective, discussion
- a reflection on your overall effectiveness and suggestions as to how you might be more effective

Be certain that both lessons are based on Indiana State Standards and that each objective in the two lessons is assessed (and please write out the full state Standards). Turn in 2 copies of the report; one will be graded and returned. Please mark the other one "file copy." (Objective 12)

P-8. Advising receipt. When advising begins (after the Summer / Fall Schedules are distributed), sign up and participate in an advising session, procure an advising evaluation, complete it and turn it in to the office, and show the receipt to me.
P-9. **Leaf collection.** Twenty pairs of leaves (including silver maple) from local trees, all pressed, neatly mounted (one face up, one face down), and bound. Arrange your leaves by some classification system (simple/compound/needles or color or . . .). Correctly identify the leaves by both English and Latin names, note where the tree is located, and which characteristics of the leaf led to its identification. Be sure to list your references. (Partly an in-class activity. If leaves do not come out before the end of the semester, the activity may be done after the end of the semester.) *(Objective 1)*

See also Field Experience requirements.

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**Assignments that reflect knowledge**

Kn-1. **Misconceptions report** *(Objective 1 and 9):* Choose a common science misconception reported in the science education literature to be the topic of your paper. Be sure that the article you read notes *how common* the misconception is and how that was determined. *(A misconceptions bibliography is included in this syllabus—but the article you use doesn’t have to be from that list.)* Photocopy the articles you cite, highlight the cited sections, and turn them in with the report. Include the following in your paper:

- a. List the common misconception. Compare it with the scientifically accepted conception.
- b. How common is the misconception? How did the researchers discover that?
- c. Explain how the misconception develops.
- d. Explain what, as a teacher, you can do to prevent or overcome that misconception.
- e. List your references.
- f. Prepare a PowerPoint demonstration to describe your findings. Submit the PowerPoint program via email before class on the due date so that it can be downloaded and ready to go when class begins.
- g. In addition prepare a report on 1 sheet of paper *(You may single space or use both sides if needed—but no more than 1 sheet of paper, including references.)*
- h. Make copies to give one to each member of the class.

Kn-2. **Concept Map** with about 18-22 concepts. Attach to the map a list of Indiana K-12 Academic Standards for middle school (grades 6, 7, and/or 8) that your map addresses. *(Please write out the standards, don't just list their numbers.)* Make sure that all the important concepts in the standards are on the map. For an A in this assignment, it must be done on a computer. However one may earn a B with a great hand-drawn map. *(Objective 1)*

Kn-3. **School Context Report.** Prepare a PowerPoint report (of 20-35 slides) about your field (or other) local school and the neighborhood around it. *(UTEP students must do this project about an urban school.)* Submit the PowerPoint presentation a day before the due date, turn in a hard copy of the report with 6 slides per page, and present the slide show (7-10 minutes) to the class. Include the following:

1) School name, address, demographics (including percentage of free and reduced lunches)
2) Photographs of the school’s exterior, interior, and its location on a map. *(Caution: Photos downloaded from the web may be of poor quality when enlarged and used in PowerPoint.)*
3) Geology: Are the school and its neighborhood situated on a landscape made by glaciers, running water, wind, or waves? How long ago was this landscape made? Briefly describe the geologic and anthropologic processes that made the local landscape.
4) Geography: Are there any lakes, rivers, floodplains, wetlands, or prairies near the school? Are they natural or man-made? If near a floodplain, is the school ever threatened by floods?
5) Environmental: From where does the school (and community) gets its water? What happens to its sewage? *(include where sewage is treated and where it is then disposed.)* Are there any environmental resources (e.g. forest, prairie) nearby. Are there any environmental hazards (e.g. superfund site, dump) nearby?
6) **History:** Who or what is the school named after? When was the school built? Was it built all at once? What did it replace when it was built? How old is the town in which your school is located? When and by whom was it founded? Is there a relationship between the location of the town center and a geological or geographical feature?

7) **Social:** How is the building used by the community (if at all) either during or after school? Do any community groups (e.g., adult education, youth groups) meet there? Does the local park department use any classrooms or the gymnasium?

8) **Standards:** Can the material in this report be used to support science standard 7.3.7 or 7.7.3? If so, how?

9) **Bibliography / list of sources** (Most students would do this without being reminded, but sometimes a reminder is nice.) **(Objective 8)**

**Notes:** Put all required material on the slides, but be sure that the font is large enough to be easily read. Don’t put too much on one slide. And during the presentation, do not read lots of text from the slides. The slides should cue you as you discuss the school.

Kn-4. **Field trip plan** for a science field trip to a local museum or other location to which you might someday take students. (Local < 3 hr. drive) Visit the site and bring a brochure or description of services for each class member. (You may assume that you teach at a particular school.) Prepare a report including:

1. A letter asking permission to take the students on the field trip addressed to a principal containing a description of the trip and activities (and the grade level for which it is planned) with a rationale. This letter must include the K-12 Academic Standards that will be addressed by the trip and it must show how what will be learned on the trip relates with what is being taught in the class. It should attempt to show that the trip is worth the time and money (if any) involved.

2. **Instructional objectives** (learning outcomes, not trip “activities”) for students written in behavioral terms.

3. **Trip information:**
   a. Name and school district of “assumed” school. Grade level of “assumed” students.
   b. Name and address of site to be visited with [real] contact persons and phone numbers.
   c. Time frame for the day / How far in advance reservations should be made.
   d. Type of transportation needed. (If busses, how many?: Name/ phone number of bus company or school transportation coordinator.)
   e. Cost analysis. (admission + transportation) Show exactly how costs were determined. (Detail is important here.) Where will the needed money come from? Should students bring extra money? [Is there a gift/souvenir shop? Vending machine?]
   f. Food requirements. (What about students on a reduced/free lunch program?)
   g. Chaperon requirements. (Report on both the site’s requirements and the school’s)
   h. Special clothing requirements, if any.
   i. What arrangements must be made for students with special needs? (Remember that there are many different types of special needs so be sure to address more than just one. What services does your site provide? If none or very few, note that.)
   j. Who will conduct the tour or visitation?

4. **Activity Sheet:** Create an activity sheet (1 page is fine) that students would complete while on the trip.

5. **Permission slip.** Create a one-page permission slip as would be needed for such a trip containing appropriate information for parents. (Such information should not be on a section of the form designed to be returned.) The form must be “Student-Ready” (look professional).

**General requirements:** Do not assume any school or district policies and do not omit any requirements. If, for instance, no food is required, please note that. You do not need to include any forms required by any particular school or school district. Turn in 2 copies, one following the above requirements and a file copy, marked “copy.” **(Objective 6)**
Kn-5. **List of free materials**: Create a list, appropriate for middle or high school science teaching, of 5 or more items (other than lesson plans and just teaching ideas) that teachers can get for just asking. You may use the *Educator’s Guide to Free Science Materials* (at the reference desk of the IUN library: Q181.A1 E3 1995) or the Web. Describe each item and explain how one can obtain the materials. Email the list to me before class so that I can distribute to all class members afterwards. Students in S508: Give a copy to your cooperating teacher. (Objective 2)

Kn-6. **Science Classroom Safety Assignment**. Details will be determined by NSTA requirements.

Kn-7. **Corrections**. One point extra credit will be given to the first student who reports, via email, grammatical or spelling errors contained in this syllabus or on any "official" papers distributed in class.

**Assignments that reflect dispositions**

D-1 **Attendance and participation**: Students are expected to attend and participate in all class activities and discussions. Students who cannot attend a class, for whatever reason, should call 980-7766 before class begins and arrange for an alternative assignment. Students who will be late, should also call. No student with an unexcused absence will receive an A. No student with two or more unexcused absences will receive a grade of B- or higher. (Objective 1)

D-2. **Science Teacher Organizations**: Provide documentation of membership in two science teacher organizations (State, national, or subject-area) or submit two 2-page reviews of articles from *The Science Teacher* or other approved science teacher journals or one of each. If memberships are applied for, do it early so that you have documentation before the end of the semester. If reviews are written, turn in a copy of the reviewed article with pertinent sentences highlighted. (Objective 11)

D-3 **Service learning activity** and documentation. After discussing this activity with your instructor, volunteer your services to assist with some sort of science instruction or educational activity at a Science Olympiad event, a local nature center, a County, State, or National Park, or other appropriate place. Submit a thank you letter or certificate documenting participation. (Objective 7)

D-4. **Graduate-student essay** (for students earning S508 or S518 graduate credit):
- **Urban experience essay**. (S508-UTEP) Write a five-page essay in which you reflect upon the teaching of middle school science in urban areas. References to Purkey and Novak's *Inviting School Success* and reflections of other teachers at your field-experience site must be included as part of the essay.
- **Transition to Teaching essay**. (S508-TtT) Write a five-page essay in which you reflect upon the teaching of middle school science. The essay must reflect upon learning to teach science through the TtT program. Students should be forthright in their stated opinions. The purpose here is to assure graduate credit for students and at the same time to improve the program.
- **S518 essay**. Write a five-page essay in which you reflect upon how the state of Indiana and your school district can give more support to classroom science teachers. Include in your essay references to ISTEP, to prerequisites to your course or other courses at your school, to funding for equipment, to professional development opportunities, and to impediments or hurdles that make your job more difficult.
FIELD EXPERIENCE REQUIREMENTS (M301 / M500 / M550 / S510)

FE-1. **Observe and reflect on at least 10 different science lessons.** S508 and M550 students who are full-time teachers should talk to Dr. Schoon about ways to meet this assignment. Reflections must be emailed ASAP after the observation or teaching experience. They must include the date and time, description of class, and how that lesson might be done differently to be more effective next time. Attach a lesson plan to all reflections that include your teaching. For the Subject heading on the email type: “Field Reflection #1,” etc. Three questions that can help guide your reflections are:

What happened?
So what?
Now what?

FE-2. **Demonstrate a discrepant event** to a middle school science class. Send in a reflection similar to those required above, but label it “Discrepant Event in the Field.”

FE-3. **Plan and teach 3 science lessons. Videotape one of them.**
- One lesson shall be expository following a direct instruction model (such as the Madelyn Hunter model with its seven steps.)
- One lesson shall be based on the learning cycle. (On your plan be sure to indicate its steps.)
- The third lesson may be any type of guided discovery (lab) instruction.

Students should prepare plans early enough, so that after discussing them with the cooperating teacher, they can be revised as necessary. Lesson plans must include measureable instructional objectives and teaching plans including sample questions that you plan to ask the children.

FE-4. **Create an assessment instrument** (e.g. quiz / checksheet) for each of the above lessons which measures whether students met each of your objectives. Use the instruments if your cooperating teacher approves.

FE-5. **Student Learning Report:** See requirements in the section above.

**Portfolio artifacts for students working towards a license (M437, M550, and S508):**

In addition to being graded, your lesson plans will be scored as portfolio artifacts for Artifact 2 (formerly called Artifact J): Higher Order Thinking Skills
VI. ASSESSMENT AND GRADING
Assignments and points possible for each

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points Possible</th>
<th>Notes</th>
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<tr>
<td>P-1 Pseudoscience report</td>
<td>√</td>
<td>Kn-6 Science Classroom Safety Assignment 30</td>
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<tr>
<td>P-2 Discrepant event demonstration</td>
<td>10</td>
<td>. Quiz 1 tba</td>
</tr>
<tr>
<td>P-3 Conference download / attendance</td>
<td>√√</td>
<td>. Quiz 2 tba</td>
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<tr>
<td>P-4 Snowflakes</td>
<td>6</td>
<td>D-1 Attendance and participation √</td>
</tr>
<tr>
<td>P-5 Web-site demonstrations</td>
<td>√</td>
<td>D-2 Science teacher organizations /or10 each</td>
</tr>
<tr>
<td>P-6 Micro-teaching</td>
<td>20</td>
<td>D-5 Service learning activity √</td>
</tr>
<tr>
<td>P-7 Student learning report</td>
<td>25</td>
<td>D-4 Graduate-student essay 15</td>
</tr>
<tr>
<td>P-8 Advising receipt</td>
<td>√</td>
<td>FE-1 Observation reflections w/ plans 30</td>
</tr>
<tr>
<td>P-9 Leaf collection</td>
<td>40</td>
<td>FE-2 Discrepant event √</td>
</tr>
<tr>
<td>Kn-1 Misconceptions report</td>
<td>24</td>
<td>FE-3 Lesson plans 30</td>
</tr>
<tr>
<td>Kn-2 Concept map</td>
<td>10</td>
<td>Video √</td>
</tr>
<tr>
<td>Kn-3 School context report</td>
<td>30</td>
<td>FE-4 Assessments 30</td>
</tr>
<tr>
<td>Kn-4 Field trip plan</td>
<td>25</td>
<td>√</td>
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<tr>
<td>Kn-5 List of Free Materials</td>
<td>15</td>
<td>Lesson plans / Artifact J</td>
</tr>
</tbody>
</table>

Note: Grades will be lowered for unexcused absences; no student with an unexcused absence will receive an A. Students who do not complete all assignments may receive an Incomplete. Lack of participation (including excessive tardies or lack of attendance) will result in grades being lowered; each absence after the first will result in a letter grade lowered. Superior ratings (A+) will be given only to assignments which need no improvement and are produced independently with little input from the instructor. Semester letter grades will be determined using the above and by the following scale:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90-92%</td>
<td>A-</td>
</tr>
<tr>
<td>85-89%</td>
<td>A</td>
</tr>
<tr>
<td>80-82%</td>
<td>B-</td>
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<tr>
<td>75-79%</td>
<td>B</td>
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<tr>
<td>70-72%</td>
<td>C-</td>
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<tr>
<td>65-67%</td>
<td>C</td>
</tr>
<tr>
<td>60-62%</td>
<td>D-</td>
</tr>
<tr>
<td>55-59%</td>
<td>D</td>
</tr>
</tbody>
</table>

VII. BIBLIOGRAPHY

General Bibliography
Misconceptions Bibliography


**VIII. Principles of the Interstate New Teacher Assessment and Support Consortium**

These courses and the School of Education’s conceptual framework are aligned with the ten principles of the Interstate New Teacher Assessment and Support Consortium (INTASC) The following chart shows the ten INTASC principles and the course objectives which apply to them.

<table>
<thead>
<tr>
<th>INTASC Principles</th>
<th>Course Objectives</th>
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<tr>
<td>1. Knowledge of Subject Matter</td>
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</tr>
<tr>
<td>2. Knowledge of Human Development and Learning</td>
<td>7, 8, 9</td>
</tr>
<tr>
<td>3. Adapting Instruction for Individual Needs</td>
<td>7, 8, 9</td>
</tr>
<tr>
<td>4. Multiple Instructional Strategies</td>
<td>2, 3, 4, 5, 8</td>
</tr>
<tr>
<td>5. Classroom Motivation and Management Skills</td>
<td>8</td>
</tr>
<tr>
<td>6. Communication Skills</td>
<td>1, 2, 8</td>
</tr>
<tr>
<td>7. Instructional Planning Skills</td>
<td>7, 8</td>
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<tr>
<td>8. Assessment of Student Learning</td>
<td>8</td>
</tr>
<tr>
<td>9. Professional Commitment and Responsibility</td>
<td>1, 10, 11</td>
</tr>
<tr>
<td>10. School and Community Partnerships</td>
<td>5, 6</td>
</tr>
</tbody>
</table>

**IX. Indiana Professional Standards Board Developmental Standards**

This course also helps students meet the following Developmental Standards established by the Indiana Professional Standards Board. Standards below that are followed by an asterisk are particularly emphasized by this course.

<table>
<thead>
<tr>
<th><strong>Early Adolescence Generalist Teachers</strong></th>
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</thead>
<tbody>
<tr>
<td>1. Young Adolescent Development *</td>
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<tr>
<td>2. Healthy Development of Young Adolescents</td>
</tr>
<tr>
<td>3. Middle School Philosophy and Organization *</td>
</tr>
<tr>
<td>4. Middle School Curriculum *</td>
</tr>
<tr>
<td>5. Middle School Instruction *</td>
</tr>
</tbody>
</table>

The standards that have an asterisk are those especially targeted by these courses.
# X. TENTATIVE SCHEDULE

<table>
<thead>
<tr>
<th>Wk:</th>
<th>Date:</th>
<th>Topic</th>
<th>Readings</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan. 12</td>
<td>Introductions, discrepant events, and course preview</td>
<td>The nature of pseudoscience</td>
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<td>Informal science: Science Olympiad</td>
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<td>Feb. 2</td>
<td>A Private Universe / Student misconceptions</td>
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<td>Seasonal activities / Long-term science activities</td>
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<td><strong>February 3, 2011: Chinese New Year</strong></td>
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<td>HASTI: No Class</td>
<td>[First Week of Field for M437]</td>
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<td><strong>February 9 - 11, 2011: HASTI Convention, Indianapolis</strong></td>
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<td><strong>February 19, 2011: IU Northwest Science Olympiad Regional Tournament</strong></td>
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<td>Good, realistic objectives and authentic assessment</td>
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<td>Mar. 2</td>
<td>Discrepant event demos / Science process skills / Discrepant event</td>
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<td>Misconception ppt presentations / The Nature of Science</td>
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<td>Models of teaching science: Direct Instruction ala Hunter</td>
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<td>Advising receipt / Student Learning Report</td>
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<td>May 4</td>
<td>Leaf collections* / Field assignments</td>
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*Depending on when leaves appear on trees this year, the leaf collections may have to be done after the end of the semester.
HIGHER ORDER THINKING SKILLS

2

E325, E547, M330, M437, M441, M457, M452, S508

4 = Excellent (clear, convincing, and consistent evidence)
3 = Quite Satisfactory (clear and convincing evidence)
2 = Needs Revision (limited evidence)
1 = Unacceptable (little or no evidence)

<table>
<thead>
<tr>
<th>Score</th>
<th>1. Identify and analyze K-12 students' levels of thinking</th>
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<tr>
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<td>2. Use instructional strategies that require students to engage in analysis, synthesis, and/or evaluation</td>
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<td>3. Specifies how the activity requires students to solve or address problems</td>
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<td>4. Include and identify materials that require a range of higher order thinking skills</td>
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</table>

Artifacts must also pass IU Northwest Writing Competency standards. See Web: [http://www.iun.edu/~writenw/competencies.shtml](http://www.iun.edu/~writenw/competencies.shtml)

ARTIFACT: ________________________________  SCORE: _____

Reviewer’s Signature: ____________________  DATE: _______