Term Information

Effective Term  
Autumn 2014

Previous Value  
Summer 2012

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)
Changing Grade Basis from Satisfactory/Unsatisfactory to Letter Grade.

What is the rationale for the proposed change(s)?
During semester change course was mistakenly entered as S/U it should be Letter Grade.

What are the programmatic implications of the proposed change(s)?
(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?
None other than students should receive a letter grade for the course. Students expect this course to be graded. The Math version was entered correctly and therefore has been graded for the past 2 years.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area  
Education: Teaching & Learning

Fiscal Unit/Academic Org  
School of Teaching & Learning - D1275

College/Academic Group  
Education & Human Ecology

Level/Career  
Graduate

Course Number/Catalog  
8722

Course Title  
Advanced Study of Thinking, Learning, & Assessment in Science Education

Transcript Abbreviation  
Adv Stds Sci Ed

Course Description  
Focuses on advanced skills and knowledge used to understand how thinking, learning, and assessment occur in science education programs.

Semester Credit Hours/Units  
Fixed: 3

Offering Information

Length Of Course  
14 Week

Flexibly Scheduled Course  
Never

Does any section of this course have a distance education component?  
No

Grading Basis  
Letter Grade

Previous Value  
Satisfactory/Unsatisfactory

Repeatable  
No

Course Components  
Seminar

Grade Roster Component  
Seminar

Credit Available by Exam  
No

Admission Condition Course  
No

Off Campus  
Never

Campus of Offering  
Columbus
Prerequisites and Exclusions

Prerequisites/Corequisites

Exclusions

Not open to students with credit for 938.27.

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 13.1316
Subsidy Level Doctoral Course
Intended Rank Masters, Doctoral

Requirement/Elective Designation

Required for this unit’s degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

• Identify and analyze the advanced skills and knowledge used to understand how thinking, learning, and assessment occur in science education programs

Content Topic List

• Introduction to the study of thinking, learning, & assessment
• Prior knowledge and misconceptions
• Cognition
• Conceptual change
• Perspectives on science learning
• Problem solving
• Models and modeling
• Assessment design: instruments and protocols

Attachments

• 8722 Adv Stds Sci Ed.doc
  (Syllabus. Owner: Post, Paul Erich)

Comments

Workflow Information

<table>
<thead>
<tr>
<th>Status</th>
<th>User(s)</th>
<th>Date/Time</th>
<th>Step</th>
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<tbody>
<tr>
<td>Submitted</td>
<td>Post, Paul Erich</td>
<td>05/16/2014 02:22 PM</td>
<td>Submitted for Approval</td>
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<tr>
<td>Approved</td>
<td>Mercerhill, Jessica Leigh</td>
<td>05/27/2014 09:57 AM</td>
<td>Unit Approval</td>
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<tr>
<td>Pending Approval</td>
<td>Achterberg, Cheryl L. Warnick, Bryan R. Odum, Sarah A. Zircher, Andrew Paul</td>
<td>05/27/2014 09:57 AM</td>
<td>College Approval</td>
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T&L 8722  
Advanced Study of Thinking, Learning, & Assessment in Science Education  

Autumn 2014

1. Course Information

   Instructor: [Instructor Name]  
   Office phone: [Office Phone Number]

   Office: [Office Location]
   Faculty email: [Faculty Email]

   Meeting time and place: Arps Hall, Room 269
   Office Hours: By Appointment

Credit hours: 3 graduate

1. Description/Rationale:

   The purpose of this course is to foster the development of the knowledge, skills, and dispositions necessary for critically analyzing educational research in the areas of science education as they pertain to assessing learning, cognition, and conceptual development. The content and activities of this course are intended to provide science education doctoral students with advanced skills and knowledge that can be used to understand how thinking, learning, and assessment occur in science education programs. The course will provide a solid grounding in both historically significant and contemporary research findings relating to thinking, learning, and assessment in science education.

2. Relationship to Other Courses/Curricula:

   This course builds upon prior knowledge relating to thinking, learning, and assessment in STEM education outlined in the introductory STEM education program core courses. This course also serves as a bridge to more advanced seminars in thinking, learning and assessment and as preparation for dissertation work focusing on these areas.

3. Topical Outline and readings:

   Week 1: Introduction to the study of thinking, learning, & assessment

   Week 2: Prior knowledge and misconceptions (Chapter from Vosniadou)  
     Conceptual Change Handbook, Chapter 27: Linn

   Week 3: Cognition
     New Perspectives on Conceptual Change, Chapter 2: Vosniadou
**Week 4:** Conceptual change (Chapter from)  
Handbook Chapter 2: Scott, Asoko, & Leach  
Conceptual Change Handbook Chapter 1: Vosniadou, Vamvakoussi, & Skopeliti

**Week 5:** Perspectives on science learning  
Handbook chapter 1: Anderson  
International Handbook, Chapter 1.1: Duit & Treagust

**Week 6:** Problem solving  
Gabel Handbook Chapter 9, Earth science: Ault

**Week 7:** Problem solving  
Gabel Handbook Chapter 10, Genetics: Stewart & Hafner

**Week 8:** Problem solving  
Gabel Handbook Chapter 11, Chemistry: Gabel & Bunce

**Week 9:** Problem solving  
Gabel Handbook Chapter 12, Physics: Maloney

**Week 10:** Models and modeling  
International Handbook Chapter 1.4: Gilbert & Boulter

**Week 11:** Assessment design: instruments and protocols  
International Handbook Chapters 7.1: Gitomer & Duschl

**Week 12:** Assessment design: instruments and protocols  
International Handbook Chapters 7.2: Black

**Week 13:** Presentation and discussion of final papers

**Week 14:** Course synthesis and review

4. **Course Requirements/Evaluation:**

Final grades in this course will be based on: a) attendance, b) participation in all class discussions and c) the student’s ability to communicate clearly in writing his/her position on issues related to research in science education. The student’s understanding of course related concepts will be presented orally during class discussions and a class presentation of a critical review, in writing with the article critiques during the course, and in writing with the final paper at the end of the course. The final paper must include: 1) a brief review of historically significant developments in research for the selected topic 2) a synthesis of at least 5 of the most significant research articles related to the selected research topic and 3) a set of research questions that would advance our current understanding of the topic. Assignments will be tailored to the student’s area of specialization and must include science education.
Each assignment for this course must illustrate the principles and ideas presented during instruction. Final grades will reflect the best professional judgment of the instructor.

Grading:

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Attendance and Participation</td>
<td>10%</td>
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<tr>
<td>Research article critiques (6)</td>
<td>30%</td>
</tr>
<tr>
<td>Leadership of a critical review</td>
<td>10%</td>
</tr>
<tr>
<td>Annotated Bibliography</td>
<td>20%</td>
</tr>
<tr>
<td>Final Paper</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Total points</strong></td>
<td><strong>100%</strong></td>
</tr>
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</table>

6. Attendance policy

Class attendance is mandatory. Should you need to miss a class session, you must contact the instructor in advance. Repeated class absences will result in a lowered score for the Class Attendance/Participation/Discussion component of the evaluation.

7. Grading scale

The university grading scale will be used:

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

8. Course readings

Selected chapters in:


Specific Readings:
12. Academic Misconduct

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized
materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an “excuse” for misconduct. If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University’s *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University. For additional information, see the Code of Student Conduct).  [http://studentaffairs.osu.edu/resource_csc.asp](http://studentaffairs.osu.edu/resource_csc.asp)

13. **Office of Disability Services Statement**
Any student who feels s/he may need an accommodation based on the impact of a disability should contact the instructor privately as soon as possible to discuss specific needs. The Office of Disability Services is relied upon for assistance in verifying the need for accommodations and developing accommodation strategies. Please contact the Office for Disability Services at 614-292-3307 (V) or 614-292-0901 (TDD) in room 150 Pomerene Hall to coordinate reasonable accommodations; [http://www.ods.ohio-state.edu/](http://www.ods.ohio-state.edu/). Students will be expected to follow Americans with Disabilities Act Guidelines for access to technology.

14. **Grievances and Solving Problems**
According to University Policies, available from the Division of Student Affairs, if you have a problem with this class, “You should seek to resolve a grievance concerning a grade or academic practice by *speaking first with the instructor or professor*: Then, if necessary, with the department chairperson, college dean, and provost, in that order. Specific procedures are outlined in Faculty Rule 3335-7-23, which is available from the Office of Student Life, 208 Ohio Union.” “Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant’s department.”

15. **Statement on Diversity**
The College of Education and Human Ecology affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.