

**Department of Education**

Term: Spring 2011

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| **Course:** | **ECE 439** Methods & Materials for  Science and Mathematics | **Professor:** | Sherri Kennedy |
| **Credits:** | 3 credit hours | **Office:**  **Office Hours:** | SCM 317  Monday 11:00 -1:00 |
| **Classroom:** | McClurg 211 | **Cell Phone:** | (803) 940-6661 |
| **Class Meets:** | Monday and Wednesday 2:00 - 3:15 | **Email:** | [sherri.kennedy@newberry.edu](mailto:sherri.kennedy@newberry.edu) |
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| **Catalog Course Description: ECE 439. Methods and Materials for Science and Mathematics. (3)**  *Prerequisite: Admission to Teacher Education.*  This course is a study of methods and materials used for teaching mathematics and sciences in the K-3 classroom. Emphasis will be on the integration of math and science content, promotion of positive attitudes toward the teaching of the content areas, concept development, questioning techniques, and multimedia teaching strategies for meeting the needs of individuals and groups. *Required of all Early Childhood Education candidates.* |
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| **Required Textbooks:**  *Teaching Student-Centered Mathematics Volume One (e-book)*, Van de Walle, John and Lovin, LouAnn, 2006, Pearson, ISBN 0-205-40843-5  *Field Experience Guide: Resources for Teachers of Elementary and Middle School Mathematics,* Pearson, ISBN 0-205-58316-4 |
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| **Texts Provided by Instructor:**  *Tools & Traits for Highly Effective Science Teaching, K-8,* Vasquez, Jo Anne, Heinemann, ISBN 978-0-325-01100-4  **Required Materials:** Composition notebook (not spiral notebook) |
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| **Additional Resources for Student use:**   * National Council of Teachers of Mathematics <http://nctm.org/> * National Science Teachers Association <http://nsta.org/> * South Carolina Council of Teachers of Mathematics <http://www.scctm.org/> * South Carolina Science Council <http://www.southcarolinascience.org/> * The Common Core Standards Initiative: <http://www.corestandards.org/> * *Qualities of Effective Teachers*, Stronge, James H. 2007, ASCD. * *Ready, Set, Science: Putting Research to Work in K-8 Science Classrooms,* Michaels, Sarah; Shouse, Andrew, and Schweingruber, Heidi. 2008, National Research Council. * *Elementary and Middle School Mathematics: Teaching Developmentally*, Fourth Edition, Van de Walle, John, 2001, Longman. * *How the Brain Learns Mathematics,* Sousa, David, 2008, Corwin Press.   **LiveText Account:** Required |
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| CACP: Level 3 |
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| Student Learning Outcomes:   1. Identify content and process standards for math and science instruction in early childhood settings. (PLC #2) 2. Identify instructional practices of highly effective math and science teachers. (PLC #3, 4) 3. Plan and implement standards-based math and science experiences for children that are developmentally appropriate.   (PLC #2, 3)   1. Plan and implement research-based experiences in math and science for young children. (PLC #2, 3, 4) 2. Demonstrate appropriate individual child assessment methods in math and science learning. (PLC # 4) |

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| Standards Alignment | | | | | | | |
| **Learning Outcomes**  The student will… | | | **Assessment(s)** | **INTASC** | **NCATE** | **SPA** | **ADEPT** | **Conceptual Framework** | |
| 1 | | Identify content and process standards for math and science instruction in early childhood settings. | Learning Log  Journal Club  Standards Projects | Standard 4:  Multiples Instructional Strategies | Standard 4: Teaching and Learning |  | APS 5: Using Instructional Strategies to Facilitate Learning  APS 6: Providing Content for Learners | Best Practices  Collaboration | |
| 2 | | Identify instructional practices of highly effective math and science teachers. | Learning Log  Journal Club  Planning Project  Strategies Project | Standard 5: Motivation and Management  Standard 6: Communication and Technology | Standard 4: Teaching and Learning |  | APS 4: High Expectations for Learners  APS 8: Environment that Promotes Learning | Best Practices  Collaboration | |
| 3 | | Plan and implement standards-based math and science experiences for children that are developmentally appropriate. | Lesson Plans  Unit Plan  Journal Club | Standard 7: Planning | Standard 4: Teaching and Learning |  | APS 5: Using Instructional Strategies to Facilitate Learning  APS 2: Short-Range Planning | Best Practices  Collaboration | |
| 4 | | Plan and implement research-based experiences in math and science for young children. | Lesson Plans  Unit Plan  Journal Club | Standard 7: Planning | Standard 4: Teaching and Learning |  | APS 1: Long-Range Planning | Best Practices  Collaboration | |
| 5 | | Demonstrate appropriate individual child assessment methods in math and science learning. | Assessment Project | Standard 8: Assessment | Standard 3: Observing, Documenting, and Assessing |  | APS 3: Planning Assessments and Using Data | Best Practices  Collaboration | |

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| Department of Education Policies **Attendance:** Candidates are expected to be present, on time, and prepared for all classes. A missed class means a missed opportunity to gain knowledge, skills, and dispositions necessary for your chosen career. Excessive absences or tardies will naturally lead to lower grades on work and tests because of these missed opportunities for learning. Three tardies count as one absence. Candidates may only miss a total of five T/TH classes or six M/W/F classes. Absences exceeding the stated number will result in a failing grade for the course.  Missing three classes without documented extenuating circumstances will result in a one letter grade reduction and a disposition form will be filed expressing concern about the candidate’s professional commitment. Candidates are responsible for content covered in class during their absence. Candidates who know in advance that they will be absent from class (for pre-authorized field trips, sports competition, conferences, or similar events) should notify the professor in writing before the absence and turn work in early. Education faculty members reserve the right to ask for verification when determining whether to allow candidates to make up tests or exams.  Candidates who are absent must contact the professor as soon as possible in writing and discuss the situation |

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| **Academic Integrity:** Cheating and plagiarism will not be tolerated. Perpetrators will receive a “0” on the assignment and a disposition form will be filed. Candidates may also be referred to the Conduct Review Board for Newberry College. Remember that plagiarism includes, but is not limited to: turning in someone else’s work as your own, not citing quoted material, using the same assignment for more than one class without PRIOR approval from the instructors, and including your name on a group project when you did not do your share of the work.  **Completing Work on Time:** Students are expected to complete **ALL** work on time. This includes but not limited to Journal Club assignments, weekly Learning Log assignments, and LiveText assignments. Late work will be accepted only for legitimate reasons. Legitimate reasons may include illness, accident, or family emergency. |

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| **Disabilities Support:** If you are a student with a documented **learning or physical disability** who requires special accommodations, it is your responsibility to make such arrangements by contacting Director of Student Academic Services, Kay Chandler, who also heads our office of Disabilities Support Services.  Her office is located in Wright Hall and she can be reached at 803-321-5187.  Following a confidential interview with you, she will contact your instructors to inform them of your special needs.  Note: Your instructors are not permitted to discuss your disabilities with you until you have registered with the office of Disabilities Support Services.  For further information, please visit [http://www.newberry-college.net/dss](https://mail.newberry.edu/owa/redir.aspx?C=5dc26cc0967c4b13abc85b0d3094a4f7&URL=http%3a%2f%2fwww.newberry-college.net%2fdss) |

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| **Electronic Media:** Please turn off all electronic devices, other than your laptop, when entering the classroom. During class, please refrain from taking cell phone calls, sending and receiving text messages and emails, surfing the Internet and listening to IPods as these activities interfere with the learning environment.  *Personal computers may be used in class for note-taking and other assignments given by the professor. Students using computers for a purpose other than mentioned above will be asked to shut down the computer* |

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| **Course Requirements**  **Field Experience: 10 hours to be assigned by Professor Kennedy**  **(**NOTE: All field experience hours must be completed in order to receive a passing grade regardless of other grades.)   * Ten hours of field experiences are required for ECE 439. Dr. Cathy Mitchell and Professor Kennedy in collaboration with Newberry County Schools will make assignments for groups of pre-service teachers to observe, assist, facilitate, and teach activities and lessons in math and science during this course. * Pre-service teachers in this course will engage in a professional learning community through a book study and a journal club format. Details of the requirements for the journal club and the book study will be provided to participants. * Each pre-service teacher will maintain a well-organized and complete learning log during the course. A rubric for the learning log will be provided. * Pre-service teachers in this course will engage in problem-based learning (PBL) as both teacher and learner. * Lesson plans and a unit plan will be developed during the course. Templates are available and will be used by the pre-service teachers. * Pre-service teachers will co-teach and teach lessons as well as receive feedback from their respective group members and Professor Kennedy. * Pre-service teachers will administer a formative assessment to a small group of children, analyze the data, and develop action plans for individual student learning. |

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| **Instruction:**  A wide variety of researched-based instructional strategies for math and science will be used during the course. Some of the strategies to be implemented are: literacy strategies, 5E model, POE, journal club, problem-based teaching & learning, project-based teaching & learning. |

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| Grading Scale: Rubrics will be given for each assignment. The scale for each rubric will be 0 to 4 points. | 3.5 < A ≤ 4  3.0 < B+ ≤ 3.5  2.5 < B ≤ 3.0  2.0 < C+ ≤ 2.5  1.5 < C ≤ 2.0  1.0 < D+ ≤ 1.5  0.5 < D ≤ 1.0  F ≤ 0.5 |

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| **Professional Dress during the Field Experience:** Teacher candidates at Newberry College are expected to behave professionally and ethically in all relationships with administrators, teachers, parents and students. In addition, candidates are expected to dress in a professional manner any time they are representing the college at a public school. Any visit to a school during a Field Experience or Internship is in effect an interview – candidates need to make a good impression for themselves and Newberry College. During field experience all candidates need to look like professional educators, not college students. |

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| **Class Conduct:** Learning is a social activity. The success of our class depends just as much on the preparation and participation of every student as it does on the preparation and participation of the instructor. Thus, the burden of instruction is shared by all in class. So it is your job to come to class prepared and willing to participate. As the instructor, I am dedicated to making our class a place where all can freely and openly participate. Everyone comes to class with a variety of ideas, points of view, and opinions. You should feel free to express those on the topics at hand while in class, regardless of what those opinions are. You should also, then, be prepared to entertain challenges to those views, either from other students or the instructor. Self-examination, questioning of assumed and long-held views, and the articulation and defense of deeply held beliefs will be asked of you. This can be scary and even painful, but our goal is to allow it to take place in a safe environment, where individuals are free to express their views and dissent. As the instructor, I am not free of these obligations. I have my own views about the topics at hand; my stand on various positions will be apparent. Yet my views should not become your views, nor should they be the views parroted back on various examinations or assessments. Test your views, argue for them, try out others. Just do not be afraid to question the assumptions of yourself and others around you, or all this college business will be largely in vain.  In an effort to create a place where views can be freely expressed and discussed, I expect (and will enforce) civil conduct in our discussions. Belittling, sarcasm, insults, and raised voices will not be tolerated.  **Emergency Procedures**:  In case of an extended loss of in-class time due to inclement weather, sickness, natural disasters, etc. students are still responsible for completing course work by following the syllabus and posting assignments in Live Text or emailing to the extent possible.  The professor will provide course resources, answer questions and make clarifications.  It is essential that we continue with instruction and assignments during a loss of in-class time.  **Evaluation and Grading**   |  |  |  | | --- | --- | --- | | **Grade** | **Percentage** | **Required Points** | | A | 90 – 100% | 450 – 500 | | B+ | 87 – 89% | 435 – 449 | | B | 80 – 86% | 400 – 434 | | C+ | 77 – 79% | 385 – 399 | | C | 70 – 76% | 350 – 384 | | D+ | 67 – 69% | 335 – 349 | | D | 60 – 66% | 300 – 334 | | F | Below 60% | Below 300 |     This course is based on a 500 point system.  Itemized as follows:   |  |  | | --- | --- | | **Graded Opportunities** | **Points Possible** | | Class Participation | 20 | | Learning Log | 40 | | Problem Based Learning Assignments (4 @ 15) | 60 | | Journal Club Assignments (3 @ 20) | 60 | | Lesson Plans for Inquiry Science | 20 | | Lesson Plans for Inquiry Math | 20 | | Teaching a lesson | 20 | | **Assignments Related to Unit Plan:** |  | | KUD Organizer | 20 | | Assessments and Rubrics | 20 | | Launch Activity | 20 | | Student Learning Map | 20 | | Acquisition Lesson Planning | 20 | | Extending Thinking Activities | 20 | | Differentiating the Unit | 20 | | Unit Plan | 120 | | **TOTAL POINTS** | **500** | |

**Course Essential Question:** How do highly effective early childhood teachers teach mathematics and science?

**Course calendar Spring Semester 2011 Monday/Wednesday 2:00-3:15**

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| **Class** | **Date** | **Topic/Activity**  *(adjustments may be made as necessary)* | **Assignments for next class**  **(***assignments may be adjusted as necessary)* |
| 1 | 1.19 | * Course Overview * Journal Club * PBL 1: Grow-Creatures | * Write a Math-autobiography and post on LiveText * Read Chapter 1 of *Tools & Traits of Highly Effective Science Teaching* and record notes in Learning Log. * PBL 1: Grow-Creatures |
| 2 | 1.24 | * Common Core State Standards Initiative * What Effective Teachers of Science Know and Are Able to Do * PBL 1 Update | * Read Chapter 2 of *Tools & Traits of Highly Effective Science Teaching* and record notes in Learning Log. * PBL 1: Grow-Creatures |
| 3 | 1.26 | * What is Inquiry Science? * STC/FOSS Science Kit * PBL 1 Update | * Read Chapter 3 of *Tools & Traits of Highly Effective Science Teaching* and record notes in Learning Log. * PBL 1: Grow-Creatures |
| 4 | 1.31 | * Linking Literacy Development and Science * STC/FOSS Science Kit * PBL 1 Assignment Due | * Read Chapter 4 of *Tools & Traits of Highly Effective Science Teaching* and record notes in Learning Log. |
| 5 | 2.2 | * Probing Children’s Thinking in Science * Journal Club: Standards Assignment | * Read Chapter 5 of *Tools & Traits of Highly Effective Science Teaching* * Journal Club Assignment: Science Standards (Process & Content) |
| 6 | 2.7 | * Designing and Delivering Effective Science Instruction * STC/FOSS Science Kit | * Read Chapter 6 of *Tools & Traits of Highly Effective Science Teaching* and record notes in Learning Log. * Journal Club Assignment: Science Standards (Process & Content) |
| 7 | 2.9 | * Supporting All Learners * STC/FOSS Science Kit * Journal Club Science Standards Assignment Due | * Read Chapter 7 of *Tools & Traits of Highly Effective Science Teaching* and record notes in Learning Log. |
| 8 | 2.14 | * Administrative Support of Effective Science Teaching * STC/FOSS Science Kit | * Read “The Mathematics and Science Integration Argument” <http://www.ejmste.com/v3n3/EJMSTE_v3n3_Furner&Kumar.pdf> * Be prepared to engage in Journal Club discussion. |
| 9 | 2.16 | * Journal Club: Integration * The Lesson Plan Template * The Unit Plan Template | * Read Chapter 1, pp. 1-10 of *Teaching Student-Centered Mathematics.* * View 4 interviews and 2 tips in ebook. * Record notes in Learning Log. |
| 10 | 2.21 | * How Children Learn and Understand Math * Meaning-Full Mathematics | * Read Chapter 1, pp. 10-top of 22 of *Teaching Student-Centered Mathematics* * Record notes in Learning Log. |
| 11 | 2.23 | * Teaching with Problems * Common Core State Standards Mathematics * Journal Club: Math Standards Assignment | * Read Chapter 1, pp. 22-36 of *Teaching Student-Centered Mathematics* * View interview and 3 tips * Record notes in Learning Log. * Journal Club Assignment: Math Standards (Process & Content) |
| 12 | 2.28 | * Planning in a Problem-Based Classroom * Assessment in a Problem-Based Classroom * PBL 2 Planning Assignment | * Journal Club Assignment: Math Standards (Process & Content) * PBL 2 Planning Assignment * Read Chapter 2, pp. 37-64 of *Teaching Student-Centered Mathematics* * View 3 interviews, workshop, activity, and 3 tips in ebook. * Record notes in Learning Log. |
| 13 | 3.2 | * Journal Club Standards Assignment Due * Developing Early Number Concepts and Number Sense | * PBL 2 * Read Chapter 3, pp. 65-93 of *Teaching Student-Centered Mathematics* * View 3 interviews and workshops in ebook. * Record notes in Learning Log. |
| 14 | 3.14 | * Teaching Math to the Pre-School and Kindergarten Brain * Developing Meaning for the Operations and Solving Story Problems | * PBL 2 * Read Chapter 4, pp. 94-121 of *Teaching Student-Centered Mathematics* * View 2 interviews, workshop, activity, and 4 tips in ebook. * Record notes in Learning Log. |
| 15 | 3.16 | * Teaching Mathematics to the Pre-adolescent Brain * Helping Children Master the Facts * PBL 2 Planning Assignment Due | * Read Chapter 5, pp. 122-156 of *Teaching Student-Centered Mathematics* * View 3 interviews, 2 workshops, activity, and 3 tips in ebook. * Record notes in Learning Log. |
| 16 | 3.21 | * Recognizing and Addressing Mathematics Difficulties * PBL 3: Problem Solving Strategies | * Read and experience *Misunderstood Minds*:<http://www.pbs.org/wgbh/misunderstoodminds/mathdiffs.html> * BL 3 Problem Solving Strategies |
| 17 | 3.23 | * Journal Club: *Misunderstood Minds* * Base-Ten Concepts and Place Value | * Read Chapter 6, pp. 157-185 of *Teaching Student-Centered Mathematics* * View interview, workshop, classroom, and tip in ebook. * Record notes in Learning Log. * PBL 3 |
| 18 | 3.28 | * Strategies for Whole Number Computation * Journal Club | * Read Chapter 7, pp. 186-222 of *Teaching Student-Centered Mathematics* * View 2 interviews, classroom, activity, and 3 tips in ebook.   Record notes in Learning Log.  PBL 3 |
| 19 | 3.30 | * Geometric Thinking and Concepts * Math Out of the Box Jigsaw | * Read Chapter 8, pp. 223-250 of *Teaching Student-Centered Mathematics* * View interview, workshop, classroom, activity, and tip in ebook. * Record notes in Learning Log. * PBL 3 |
| 20 | 4.4 | * Developing Measurement Concepts * FOSS Measurement Kit | * Read Chapter 9, pp. 22-36 of *Teaching Student-Centered Mathematics.* * Record notes in Learning Log. * PBL 3 |
| 21 | 4.6 | * Early Fraction Concepts * Measurement and Fractions * PBL 3 Assignment Due | * Read Chapter 10, pp. 275-309 of *Teaching Student-Centered Mathematics.* * View 2 interviews, workshop, activity, classroom, and 4 tips in ebook. * Record notes in Learning Log. * Unit Plan |
| 22 | 4.11 | * Algebraic Reasoning * Math Out of the Box Kit | * Read Chapter 11, pp. 310-330 of *Teaching Student-Centered Mathematics.* * View 2 interviews, activity, and 2 tips in ebook. * Record notes in Learning Log. * Unit Plan |
| 23 | 4.13 | * Helping Children Use Data * Real Assessment for Real Students * PBL 4: Assessment | * Read Chapter 12, pp. 331-349 of *Teaching Student-Centered Mathematics.* * View 3 interviews, classroom, activity, and 2 tips in ebook. * Record notes in Learning Log. * Unit Plan |
| 24 | 4.18 | * Probability Concepts * Journal Club | * PBL 4: Assessment Project * Unit Plan |
| 25 | 4.20 | * Unit Plan Workshop * Integrating Math and Science: How do you do that? | * PBL 4: Assessment Project * Unit Plan |
| 26 | 4.25 | * Integrating Math and Science: How do you do that? * Final Journal Club | * PBL 4: Assessment Project * Unit Plan |
|  | 4.27 | * READING DAY | * Unit Plan and PBL 4 are due no later than Friday, April 29, 2011, at 4:00 pm |
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**Research Base**

National Council of Teachers of Mathematics *Curriculum Focal Points*: <http://nctm.org/standards/content.aspx?id=270>

National Council of Teachers of Mathematics *Principles and Standards for School Mathematics:* [*http://nctm.org/standards/content.aspx?id=16909*](http://nctm.org/standards/content.aspx?id=16909)

National Science Teachers Association Position Statement:<http://nsta.org/about/positions/elementary.aspx>

South Carolina Mathematics Academic Standards: <http://ed.sc.gov/agency/Standards-and-Learning/Academic-Standards/old/cso/standards/math/index.html>

South Carolina Science Academic Standards: <http://ed.sc.gov/agency/Standards-and-Learning/Academic-Standards/old/cso/standards/science/index.html>

The Common Core Standards Initiative: <http://www.corestandards.org/>

Sousa, David A., (2008) *How the Brain Learns Mathematics*, Thousand Oaks, CA: Corwin Press.

Michaels, Sarah, Shouse, Andrew W., Schweingruber, Heidi A. (2008) *Ready, Set, Science! Putting Research to Work in K-8 Science Classrooms*. Washington, DC: The National Academies Press.