

**Auburn University Course Syllabus  
SPRING 2013**



**Course Number:** CTEC 3020  
**Course Title:** Primary Math and Science  
**Credit Hours:** 3 semester hours  
**Prerequisites:** Admission to Early Childhood Teacher Education  
**Co-requisites:** None

**Instructor:** Angela Love, Ph.D., Early Childhood Education Program Coordinator

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**Office Hours:** **Tuesdays, 3:45 - 6:15 pm and Wednesdays, 9:00 am - 12:00 pm; and by appointment**

**\*Email communication is best for more prompt response; email for appointment during or outside of office hours**

**Required Text:**

Caldwell, J. H., Karp, K., Bay-Williams, J. M. (2010). *Developing essential understanding of addition and subtraction for teaching mathematics in prekindergarten – grade 2*. Reston, VA: The National Council of Teachers of Mathematics, Inc.

Dougherty, B. J., Flores, A., Louis, E., & Sophian, C. (2010). *Developing essential understanding of number and numeration for teaching mathematics in prekindergarten – grade 2*. Reston, VA: The National Council of Teachers of Mathematics, Inc.

\*Kamii, C. K., & DeVries, D. (1993). *Physical knowledge in preschool education: Implications of Piaget's theory*. New York, NY: Teachers College Press

Required reading includes articles from journals published by NAEYC (see note below), and additional texts. All readings will be announced on Canvas one week in advance (at least).

### **Recommended Texts:**

**Several texts we will read come from the Early Childhood Professional Organization, National Association for the Education of Young Children (NAEYC), and I highly recommend you join this organization; as a student member you are eligible for a discount on the texts:** National Association for the Education of Young Children: <http://www.naeyc.org>

\*Kamii, C., & Housman, L. B. (2000). *Young children reinvent arithmetic: Implications of Piaget's theory* (2<sup>nd</sup> Ed.). New York, NY: Teachers College Press

Larson, M. R., Fennell, F., Adams, T. L., Dixon, J. K., Kobett, B. M., & Wray, J. A. (2012). *Common core mathematics in a PLC at work: Grades K-2*. Bloomington, IN: Solution Tree and Washington, D. C.: The National Council of Teachers of Mathematics, Inc.

Nemeth, K. N. (2012). *Basics of supporting dual language learners: An introduction for educators of children from birth through age 8*. Washington, D. C.: National Association for the Education of Young Children (NAEYC).

Smith, S. S. (2013). *Early childhood mathematics* (5<sup>th</sup> Ed.). Boston: Pearson.

Whitin, P., & Whitin, D. J. (2000). *Math is language too: Talking and writing in the mathematics classroom*. Urbana, IL: National Council of Teachers of English (NCTE).

**\*These texts are required for CTEC 3030/4911 as well.**

### **COURSE DESCRIPTION**

This course is to provide pre-service teachers opportunities to be more knowledgeable and practical in early childhood (Pre-K, K-3<sup>rd</sup> grade) curriculum and instruction in the areas of mathematics and science. Pre-service teachers will have a better understanding of children's learning and development, curriculum development, and instructional methods. Based on their understanding of early learning standards as well as aforementioned areas, pre-service teachers will apply their knowledge to designing, implementing, and evaluating the interdisciplinary curriculum. In addition, through hands-on activities and teaching

demonstrations, they will also develop effective teaching strategies working with young children that can be used in their future classrooms.

## **COURSE OBJECTIVES**

Upon completion of the course, students will be able to:

1. Identify important mathematics /science content, process skills, and attitudes appropriate to young children. (NAEYC Standard 1b, 4a, 4b, 4c, & 4d)
2. Become acquainted with the principles and elements of curriculum development (e.g., goal setting, planning, implementing, and assessing curriculum) in mathematics and science. (NAEYC Standard 1a, 1b, 1c, 4b, 4c & 4d)
3. Develop an understanding that early childhood curriculum is an integrated curriculum, and that children's learning in mathematics and science takes place in integrated learning experiences with concrete materials in a variety of contexts. (NAEYC Standard 4c)
4. Design, implement, and evaluate developmentally appropriate curricular content, strategies, and instructional materials, and reflect on their performance. (NAEYC Standards 1a, 1b, 1c, 4b, 4c, & 4d)
5. Understand how to record, report, and evaluate development level of young children through naturalistic/performance-based assessment and utilize developmentally appropriate assessment and reporting techniques. (NAEYC Standards 3a, 3b, & 3c)

## **USEFUL WEBSITES**

National Association for the Education of Young Children: <http://www.naeyc.org>

National Council of Teachers of Mathematics (NCTM): <http://www.nctm.org>

National Science Teachers Association (NSTA): <http://www.nsta.org>

National Council of Teachers of English (NCTE): <http://www.ncte.org>

Alabama Math, Science, and Technology Initiative: <http://www.amsti.org>

Alabama State Department of Education: <http://www.alsde.org>

American Montessori Society: <http://www.amshq.org>

North American Montessori Teachers Association: <http://www.montessori-namta.org>

## **AUBURN COLLEGE OF EDUCATION-CONCEPTUAL FRAMEWORK**

### Competent

Competent professionals demonstrate the knowledge and skills needed to facilitate the learning of the individuals they serve. Their competence enables them to model and promote active, collaborative, and ongoing learning. Their efforts are enhanced by their abilities to foster learning communities that are safe, stimulating, and enriched with diversity; engage in reasoned and purposeful decision making; and implement their professional practices in proactive, flexible, and self-regulating ways.

We recognize that the development of professional competence is linked to levels of preparation and experience. We also acknowledge that competence continues to develop over the course of an entire career.

### Committed

Committed professionals make reasoned decisions based on thoughtfully constructed values. As a College, we strive to nurture values that support the learning of all people, honor diversity, protect the integrity of learning, and expand the scholarship of our professions. We view these values as professional dispositions, and we define them as filters for responsible decision-making. Our College emphasizes the conscious development of commitments related to professional responsibilities and ethics, collaboration, diversity, and intellectual vitality.

### Reflective

We choose to frame reflection as a critical and pervasive habit of mind that permeates and fuels the ongoing expansion of competence and the continued development of reasoned commitments. Reflective professionals subject their own competencies and commitments to continuous scrutiny as they systematically monitor the impact of their professional practices on the individuals they serve and make adjustments as needed. Thoughtful reflection emphasizes reviewing and analyzing past practices in ways that influence and improve future practices. This stance inspires self-initiated professional growth and results in increased capacities for addressing the complexities and dilemmas situated within the work of educational and human services professionals.

## **COURSE REQUIREMENTS**

Specific criteria in rubric format will be discussed as due date approaches for items 1-5.

1. **Math Journal/Notebook of Lessons, Ideas, Weekly Reflections, & Weekly observations (30 Points):** Teacher candidates will maintain a journal
  - a. That references math lessons modeled in class and observed in the field, and the Domains from the Alabama Course of Study/Common Core State Standards that each addresses.
  - b. With weekly reflections on the assigned article/reading for the week, addressing the study guide questions posted Canvas for each week's readings
  - c. With detailed description of observations from the field experience in this class (at the Auburn Montessori School – The Children's House)
2. **Participation in weekly observations (20 points):** Teacher candidates will participate in a weekly classroom experience at the Auburn Montessori School: The Children's House ([231 East Drake Ave., Auburn, Alabama 36830](#)); (334) 740-6192. A schedule will be posted and you may sign up for one of the hours each week that meets your schedule.

3. **Math Game/Lesson Plan (30 points):** Develop lesson plans for 1 math game – a board game (this game is to be of your own making, not downloaded from the internet, but made in conjunction with an approved choice of a children’s book or short story – criteria will be discussed in class), reflecting at least one of the Domains of the 2010 Alabama Course of Study and the Common Core State Standards. These lesson plans (including and introduction to math game with children’s book or poem plus the math objectives for playing the games and instructions for the game that are child friendly) will go into your math journal as well as in a digital format to be uploaded to Canvas. The game will be presented in class. Criteria will be posted on Canvas.
4. **Mathematics observation and analysis (50 points):** This assignment has two parts, two separate observations. **Part 1** – Observe in the Montessori School how children learn math. Write in detail what tasks you observe, what the child you observed accomplished, and reflect on the standards we are learning in relation to what you observed. Have a conversation afterward (after you have thought about the knowledge the child is building) with the teacher to find out what the goals of the task were. Write in your math journal what your thinking is compared to what the teacher’s response was to your questions. Part 1 requires a reflective paper uploaded to Canvas detailing your observation and what you learned from observing this particular math lesson. **Part 2** – Choose **two** children to observe over a period of time, a minimum of **four** observations each (15-20 min. each on 4 different days), during tasks that address mathematical thinking. Describe the tasks, describe the sequence of observations, connect the observations to the standards (ALEX and CCSS), and reflect on what you learned from the longitudinal study of one child’s developing sense of number, geometry, relationships, patterns, etc. Connect directly to the texts/articles/resources we are reading and discussing in class and on Canvas.
5. **Physical Knowledge observation (25 points):** Observe two children playing in a natural setting exploring physical knowledge. Include the transcript from this event, and analyze the social interaction as well as the learning each of the children gained. Explain how you assessed the learning you observed, and which Alabama Course of Study and Common Core State Standards you attributed to this event. This observation may need to be at a different time than your regular observation time at the Children’s House – Auburn Montessori School.
6. **Family Activity Plan (25 points):** Create an activity plan that is appropriate for families and will support young children’s learning of mathematical thinking or scientific exploration of physical knowledge. We will practice this in class and you will use your activity plan with someone who has children in the age range of 3 – 8 years. Criteria will be discussed in class.
7. **Midterm Exam (20 Points)**
8. **Final Exam (20 Points)**

**9. Participation and Professional Behavior (15 Points):** All students are required to attend all classes, be punctual, and be active participants in class discussions and activities. Students are also expected to be respectful to others by not displaying disruptive or inappropriate behavior during class. *(This includes talking while another student has been acknowledged to speak, as well as while the instructor is speaking, texting or using a mobile device in any other inappropriate manner unrelated to the course.)* Points will be deducted from the original 15 when an infraction occurs (as determined by the instructor) and the student will be notified that points were deducted within a reasonable time after the infraction. Each incidence of unprofessional behavior will result in a 2-4 pt. deduction, depending on whether the behavior has already been addressed or not, from the 15 points allotted for this course requirement.

#### GRADES

Requirements and Points	Grades
<ul style="list-style-type: none"> <li>➤ Math Journal/Notebook of Lessons, Ideas, Reflections, &amp; Weekly observations (30 points)</li> <li>➤ Weekly observation (20 points)</li> <li>➤ Math game/lesson plan (30 points)</li> <li>➤ Mathematics observation &amp; analysis/presentation (50 points)</li> <li>➤ Physical Knowledge observation (25 points)</li> <li>➤ Family Activity Plan (25 points)</li> <li>➤ 2 Exams (40 points)</li> <li>➤ Class Participation and Professional Behavior (15 points)</li> </ul>	<p>A = 235-212 points            B = 211-188 points            C = 187-165 points            D = 164-141 points            F = 140 - 0 points</p>
<b>Total: 205 points</b>	

#### CLASS POLICY STATEMENTS

Participation: Students are expected to participate in all class discussions and participate in all exercises. It is the student's responsibility to contact the instructor if assignment deadlines are not met. Students are responsible for initiating arrangements for missed work.

Attendance/Absences: Attendance is required at each class meeting. If an exam is missed, a make-up exam will be given only for University-approved excuses as outlined in the [Student Policy eHandbook](#). Arrangement to take the make-up exam must be made in advance. Students who miss an exam because of illness need a doctor's statement for verification of sickness and should clear the absence with the instructor the day they return to class. Other unavoidable absences from campus must be documented and cleared with the instructor in advance. **Each unexcused absence** will result in 5 points deducted from the class participation grade. **Tardy arrivals** will result in 2 point deducted from the class participation grade. If points from absences and tardy arrivals exceed the 20 points allotted for class participation, the points will be taken from the final total. **Three unexcused absences may result in a teacher candidate being dropped from the program.**

**Accommodations:** Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT). See <https://fp.auburn.edu/disability/faculty/syllabus.asp>

**Honesty Code:** The University Academic Honesty Code and the [Student Policy eHandbook](https://sites.auburn.edu/admin/universitypolicies/Policies/AcademicHonestyCode.pdf) Rules and Regulations pertaining to Cheating and Plagiarism will apply to this class. See <https://sites.auburn.edu/admin/universitypolicies/Policies/AcademicHonestyCode.pdf>

**Professionalism:** As faculty, staff, and students interact in professional settings, we are expected to demonstrate professional behaviors as defined in the College's conceptual framework. These professional commitments or dispositions are:

1. Creates a caring and supportive learning environment and encourages self-directed learning by each student..
2. Demonstrates behaviors that are consistent with the ideals of fairness and the belief that all students can learn.
3. Demonstrates, models, and exemplifies a commitment to diversity.
4. Engages in responsible and ethical professional practices (shows trustworthiness, nurtures professional relationships, maintains confidentiality regarding students and school matters).
5. Demonstrates professionalism by being prepared, dressing professionally, communicating appropriately, and fulfilling attendance expectations.
6. Shows respect for and cooperates with students, families, colleagues, and members of the community.
7. Shows initiative and self-direction in classroom activities (e.g., organization and management of classroom, planning and implementation of instruction).
8. Follows policy regarding use of digital tools and models digital citizenship and responsibility (e.g., the appropriate use of social media).
9. Contributes to collaborative learning community, models and nurtures intellectual vitality, and demonstrates interest and enthusiasm for the profession.
10. Accepts/acts on constructive criticism and suggestions in a professional way.
11. Monitors and adjusts own professional dispositions as necessary.
12. Reflects on and analyzes past practices to stimulate ongoing improvement for future practice.

**\*Mobile Device Policy:** Smartphone use or text messaging or unapproved iPad/Tablet or laptop usage during the class session is viewed as extremely unprofessional and will result in an automatic loss of 5 points of **Class Participation and Professional Behavior grade points**



(under COURSE REQUIREMENTS) for the first occurrence; additional points will be deducted for repeated occurrences. It is best that phones, iPads, and laptops not be visible during the class session to avoid any misunderstanding of their use.

## Reading Assignments/Assignment Due Dates

*This calendar is subject to change based on the needs of the class, knowledge gained, and practice needed to master the concepts taught in this course. Dr. Love will make this determination and give adequate notice of any revisions made.*

Dates	Topic	Reading/ Assignments (Due)
1/10 Week 1	Course Introduction; Community Building Activities	Syllabus In-class activity
1/15 Week 2	Linking Children's Literature to Math -	<ul style="list-style-type: none"> <li>Be sure to go to Canvas and complete Module 1 (all directions on Canvas)</li> <li>Purchase composition notebook for observations, reflections, and lesson correlations.</li> <li>Read articles (Developing math games based on children's literature; Choosing Books You Can Count On) and reflect in your math journal on the study guide question:  <i>1. With the aid of the Choosing Books You Can Count On, select a favorite children's book &amp; using the authors' guidelines for "Making Math Games" from the 2<sup>nd</sup> article, draft a design of a simple board game (all in your journal); what age? What variations could you adapt for somewhat younger or older? What choices did you make about the "type" of board game you chose to go with the text? Were there other feasible choices?</i>  <i>2. Why use games to teach?</i> </li> </ul>
1/17	Introduction to Montessori – American Montessori Society: <a href="http://www.amshq.org">http://www.amshq.org</a> North American Montessori Teachers Association: <a href="http://www.montessori-namta.org">http://www.montessori-namta.org</a>	<ul style="list-style-type: none"> <li>Browse the two Montessori websites provided in this syllabus (and on Canvas) – <i>construct 3 questions about the philosophy and teaching methods from your reading</i> (in your math journal and bring to the class meeting at the Montessori school)</li> </ul>



1/22 Week 3	Overview of 2010 Alabama Course of Study & Common Core State Standards for Mathematics	<ul style="list-style-type: none"> <li>• <b>OBSERVATIONS BEGIN THIS WEEK AT THE MONTESSORI SCHOOL:</b> Auburn Montessori: The Children's House @ 231 E. Drake Ave, Auburn, (334) 740-6192 (**on the Tiger Transit line; if you need to take the bus – be sure to leave in plenty of time to arrive at your designated time)</li> <li>• Print a Copy of 2010 Alabama Course of Study for Mathematics through Grade 3. Bring to class each night hereafter.</li> <li>• Read NCTM's <i>Number &amp; Numeration</i> CH 1 – reflect in math journal using study guide from Canvas</li> <li>• Handout on Canvas (CCSS for Math)</li> </ul>
1/24	Representation and The Importance of Social Interaction; Language of Math (songs, chants, literature, NCTM Process Standards, symbolic representation)	<ul style="list-style-type: none"> <li>• Article/Reflection on Study Guide</li> <li>• In class – collaboratively invent/design a math game based on Pete the Cat story read in class</li> </ul>
1/29 Week 4	One to One Correspondence and Number Sense and Counting	<ul style="list-style-type: none"> <li>• <b>Math Journals Due I (check ½ the class)</b></li> <li>• Read NCTM's <i>Number &amp; Numeration</i> CH 2/ Reflection on Study Guide</li> </ul>
1/31	Engaging with families in supporting young children's learning	<ul style="list-style-type: none"> <li>• <del>DRAFT Math Game/Lesson Plan w/ Children's book due</del></li> <li>• Article/Reflection on Study Guide</li> <li>• In class – present your math game ideas</li> </ul>
2/5 Week 5	One to One Correspondence and Number Sense and Counting Continued; Logic and Classifying (matching, classification, comparing, order & seriation)	<ul style="list-style-type: none"> <li>• <del>Math Observation and Analysis Part 1 due</del></li> <li>• Read NCTM's <i>Number &amp; Numeration</i> CH 3/ Reflection on Study Guide</li> </ul>

2/7	Math and Art <b>AMSTI VISIT</b>	<ul style="list-style-type: none"> <li>• Article/Reflection on Study Guide</li> <li>• In class – collaboratively plan a family engagement activity you could use to support young children's mathematical thinking</li> </ul>
2/12 Week 6	Patterns & Functions; Concepts Algebra	<ul style="list-style-type: none"> <li>• <b>Math Journals Due II (check ½ the class)</b></li> <li>• Read NCTM's <i>Addition and Subtraction</i> CH 1/ Reflection on Study Guide</li> </ul>
2/14	Music and Math	<ul style="list-style-type: none"> <li>• <b>Math Observation and Analysis Part 1 due</b></li> <li>• <del>• DRAFT Family activity plan due</del></li> <li>• Article/Reflection on Study Guide</li> <li>• In class – present your family engagement activity ideas</li> </ul>
2/19 Week 7	Operations on Whole Numbers/ Place Value	<ul style="list-style-type: none"> <li>• <b>DRAFT Family activity plan due</b></li> <li>• <del>• DRAFT Math Game/lesson Due</del></li> <li>• Read NCTM's <i>Addition and Subtraction</i> CH 1/ Reflection on Study Guide</li> </ul>
2/21	Reflect and Review for Midterm	<ul style="list-style-type: none"> <li>• <b>DRAFT Math Game/lesson Due</b></li> <li>• <del>• Best Math Game/lesson presented</del></li> <li>• Study Guide for midterm – questions you have</li> </ul>
2/26 Week 8	<b>Midterm Exam</b>	
2/28	<b>THIS CLASS ALLOWED FOR OBSERVATIONS</b> ** Last day to withdraw from course with no grade penalty. "W" assigned.	
3/5 Week 9	Measurement/ Data, Graphing & Probability	<ul style="list-style-type: none"> <li>• <b>Best Math Game/lesson due &amp; presented</b></li> <li>• <del>• Math Journals Due III (check ½ the class)</del></li> <li>• Read NCTM's <i>Addition and Subtraction</i> CH 2-3/ Reflection on Study Guide</li> </ul>
3/7	Geometry: Shapes & Spaces	<ul style="list-style-type: none"> <li>• <b>Family activity plan due</b></li> <li>• <b>Math Journals Due III (check ½ the class)</b></li> <li>• Article/Reflection on Study Guide</li> <li>• In class – activity</li> </ul>

3/11-15	<b>AU SPRING BREAK</b>	
3/19 Week 10	Basics of Science Instruction; Science Process Skills; Physical Science; Piaget's 3 types of knowledge	<ul style="list-style-type: none"> <li>Read Kamii &amp; DeVries CH 1/Reflection on Study Guide</li> </ul>
3/21	Balls and ramps	<ul style="list-style-type: none"> <li>AMSTI Article/Reflection on Study Guide</li> <li><b>Young engineers video from early childhood science, technology, engineering, and math (STEM)</b></li> <li>In class – collaboratively study/create balls and ramps activities</li> </ul>
3/26 Week 11	Why use physical knowledge	<ul style="list-style-type: none"> <li><b>Math Journals Due IV (check ½ the class)</b></li> <li>Read Kamii &amp; DeVries CH 2/Reflection on Study Guide</li> </ul>
3/28	Rollers, target ball, inclines, water play, and the pendulum (**visit to the Chemical Engineering building)	<ul style="list-style-type: none"> <li>Read Kamii &amp; DeVries CH 4-8 (sign up for the chapter of your choice on Canvas – limit 4 per chapter)/Reflection on Study Guide</li> <li><b>Class field trip to the Chemical Engineering building to see pendulum (together)</b></li> <li>In class – collaboratively create physical knowledge activity ideas</li> </ul>
4/2 Week 12	Objectives/Principles of Teaching Young Children AMSTI Guest Speaker To be Announced	<ul style="list-style-type: none"> <li><b>Math Observation and Analysis Part 2 due</b></li> <li>Read Kamii &amp; DeVries CH 3/Reflection on Study Guide</li> </ul>
4/4	Adding Art to STEM = STEAM	<ul style="list-style-type: none"> <li><b>DRAFT Physical knowledge activity lesson plan due</b></li> <li>Article/Reflection on Study Guide</li> <li>In class – present your physical knowledge activity ideas</li> </ul>
4/9 Week 13	<b>THIS CLASS ALLOWED FOR OBSERVATIONS</b>	<ul style="list-style-type: none"> <li>Dr. Love is available for meeting with individual students</li> </ul>
4/11	<b>THIS CLASS ALLOWED FOR OBSERVATIONS</b>	<ul style="list-style-type: none"> <li>Dr. Love is available for meeting with individual students</li> </ul>

4/16 Week 14	Professional Development, Working with Families	<ul style="list-style-type: none"> <li>• <b>All Math Journals Due</b></li> <li>• <b>Physical Knowledge Activity due</b></li> <li>• In class – present your physical knowledge activities</li> </ul>
4/18	Reflect and Review	<ul style="list-style-type: none"> <li>• Article/Reflection on Study Guide</li> <li>• In class – present your physical knowledge activities</li> </ul>
4/23 Week 15	Reflect and Review for Final	<ul style="list-style-type: none"> <li>• Study Guide for final – questions you have</li> </ul>
4/25	<b>THIS CLASS ALLOWED FOR OBSERVATIONS</b>	<ul style="list-style-type: none"> <li>• Dr. Love is available for meeting with individual students</li> </ul>
<b>*4/29-5/3</b>	<b>*Final Exam as Scheduled by University</b>	