TED UNIVERSITY
COLLEGE OF EDUCATION

ECE 311 EARLY CHILDHOOD
MATH, SCIENCE AND TECHNOLOGY EDUCATION

(3+0+2) 4 Credits/7 ECTS Section
FALL, 2016

Instructor: Assist. Prof. Dr. Elif Karslı
Time and Place: Thursdays at 10:00/12:50
Fridays at 14.00/15.50 at Pedagogy Lab
Office Hours: Tuesdays, 9.00-11.00
E-mail: elif.karsli@tedu.edu.tr (the fastest way to contact me)
Office Phone: 0312 585 0 175

Yours is not to reason why;
just invert and multiply!

Catalog description: Development of math, science and technology concepts in young children. Development of problem solving, critical thinking, inquiry, observation skills. Teaching fundamental math, science and technology concepts to young children. Math, science and technology tools and materials for early childhood teaching. Design of early childhood math, science and technology learning environments. Assessment of math, science and technology learning.

Course Description: An integrated affective approach to math, science, and technology learning. Development of fundamental math, science, and technology concepts in young children. Basics of science: physical science, life science, earth, and space science. One-on one correspondence, number sense, and counting, logic and classifying, comparing, shapes, spatial sense, parts and wholes, ordering, seriation and patterning, measurement, interpreting data using graphs, groups, and symbols. Development of problem solving, critical thinking, inquiry, observation skills. Young children and technology. Math, science, and technology tools and materials for early childhood teaching. Design of early childhood math, science, and technology learning environments. Assessment of math, science, and technology learning.

Course Learning Outcomes:
Upon succesful completion of this course, a student will be able to:
1. explain the central concepts, tools of inquiry, and structures of early childhood math, science and technology education
2. develop developmentally appropriate math, science and technology curriculum and instructional plans in early childhood education
3. utilize appropriate instructional strategies for teaching math, science and technology to young children
4. design appropriate math, science and technology learning experiences and environments for young children
5. use appropriate assessment tools and techniques to evaluate young children's understanding

of math, science and technology concepts and their math, science and technology skills
6. exhibit knowledge of how to use resources, materials, media, and technology to implement a early childhood math and science education program

Course Readings:

Clements, D. H., & Sarama, J. (2007). Early childhood mathematics learning. In F. K. Lester, Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 461-555). New York: Information Age Publishing.

Charlesworth, R. & Lind, K. K. (2010). *Math and science for young children*. Belmont, CA: Wadsworth/Cengage Learning.

Donohue, C. Ed. *Technology and Digital Media in the Early Years: Tools for Teaching and Learning.* New York: Routledge & Washington, DC: NAEYC

Moomaw, S. (2013). *Teaching STEM in the early years: Activities for integrating Science, Technology and Engineering.* St. Paul, MN: Redleaf Press.

Student Workload (Total 180 Hrs)
Readings (30 hrs), Hands-On Work (14 hrs), Homework (20hrs), Resource Review (20hrs), Portfolio (32 hrs), Field trips (20hrs), Observation (14 hrs), Report on a topic (10 hours), Case Study Analysis (10 hours), Demonstration (10 hours).

Planned Learning Activities & Teaching Methods
Observation, Hands-on Work, Resource Review, Inquiry, Telling/explaining, Discussion, Questioning, Scaffolding/Coaching, Demonstrating, Predict-Observe-Explain, Video Presentations, Web Searching, Using Social Media

COURSE POLICIES

I. TED University Code of Academic Integrity
TED University takes academic integrity seriously. **Please read through the entire code acquaint yourself with how violations are defined.** Entire code might be found at the following link: http://www.tedu.edu.tr/Assets/Documents/Content/genel/TEDU-Academic-Catalog.pdf

II. Attendance
This course requires your regular participation, attendance and punctuality. It is expected you to attend the class on a regular basis and be on time. It is your responsibility to keep in touch with me about the emergencies prior to class. Exceeding 10% of attendance with unexcused absences will result a half letter grade reduction.The TEDU policy concerning attendance will be followed strictly.

III. Late Work
You are supposed to turn in each assignment on time. I will only accept late assignments in unusual circumstances (e.g. documented illness). In all other cases, I will reduce %10 of the total point per day for late work, and the assignment will not be accepted after three days late.

IV. Assignment Rules
All assignments must be typed and prepared in APA style. It is expected that you turn in assignments on time.

V. Academic Honesty Policy
This course adheres to the academic honesty policy. I expect that all work submitted and presented by you will be your own original work and that the contributions of others will be openly acknowledged. Failure to adhere to this policy will result in disciplinary action. For more information:
a. Plagiarism is a form of dishonesty that occurs when a person passes off someone else's work as his or her own. This can range from failing to cite an author for ideas incorporated into a student's paper to cutting and pasting paragraphs from different websites to handing in a paper downloaded from internet. All are plagiarism.
b. *All parties to plagiarism are considered equally guilty.* If you share your coursework with another student and she plagiarizes it, you are considered as guilty as the one who has plagiarized your work, since you enabled the plagiarism to take place. *Under no circumstances should a student make his her coursework available to another student unless the instructor gives explicit permission for this to happen.* Copying someone's work is an extreme and straightforward act of plagiarism. More commonly, however, students plagiarize without realizing they are doing so. This generally happens when a student fails to acknowledge the source of an idea or phrasing. *Avoid plagiarism by citing sources properly!*

VI. Announcements
All announcements will be sent to your e-mail address. It is your responsibility to keep your e-mail address operative all times. Check your e-mails regularly in order to be informed.

COURSE ASSIGNMENTS

1. Reading Responses (25%)
Each week you are supposed to read the assigned chapters/articles and be ready to engage in conversations during the class. Before each class, you are supposed to write a 200-words reflection paragraph. We will start each class by discussing the questions you bring to the class. Your reading reflections are **due on Wednesdays at 2 p.m.** Please email your reflection to me (elif.karsli@tedu.edu.tr) and bring a (hard/soft) copy for yourself.

2. Activity Portfolio (45%)
Portfolio is a collection of different types of information gathered over time. It includes a wide range of materials representing the new knowledge and skills gained. For this class, you are supposed to prepare an activity portfolio. Your portfolio should be a collection of all the artifacts such as effective practices, activities, resources, lesson plans, and position statements related to math, science, technology and engineering in early years. Throughout the semester, we will pick and implement activities from Moomaw's book in addition to the ones that you will develop. This semester we will work on how to prepare lesson plans for different age groups. Throughout the semester, you will bring 4 lesson plans related to STEM and implement these lessons during our course time. Your peers and I will engage in the activities and provide you feedback. You are supposed to revise your lesson plan accordingly before putting it in your portfolio.
You should prepare your portfolio in a way that you and your teacher colleagues could use it in the future as a rich resource when teaching children STEM (For example, you all should have at least 24 lesson plans in your portfolio at the end of the semester). You have one check point dates listed in the schedule that you are supposed to share your portfolio with the rest of the class, and will receive the %20 of your grade. Your final portfolio is due on the last of the classes.

3. Research Paper (30%)
In this class, you will engage in several readings about the development of children's thinking in STEM related areas, how to design STEM rich experiences for young children, and how to assess children's STEM related learnings. For the purposes of this assignment, you will select a specific topic, then generate a research question that you are interested in delve into. With your research question in mind, you will conduct an intensive literature review and write a research paper. You are supposed to cite at least 10 resources in your paper. Your research paper will be at least 10 pages long, double-spaced and strictly following the APA guidelines. Throughout the semester I will work with you to come up with a specific topic and a well-formulated research question.
Please use databases such as Education Research Complete, ERIC (at EBSCOhost), JSTORE, Child Development and Adolescent Studies for your search. Below is the list of journals that you will want to check:

Teaching Children Mathematics
Young Children
Journal of Research in Science Teaching
Technology, Pedagogy and Education
Early Childhood Research Quarterly
Journal of Early Childhood Research
Australasian Journal of Early Childhood Education

Your research paper is due on the finals week. However, please see the schedule for the check point dates (CCP).

All the course requirements will be clarified in a timely manner before the activity or assignment is due.

<u>Grading Rubrics</u>
Grading rubrics for field trip reflections and instructional presentation will be presented and clarified in class in a timely manner before they are due.

<u>Grading</u>

<table>
<tr><th>Activity</th><th>Percentage</th><th colspan="2">Grading Scale</th></tr>
<tr><td>Reading Responses</td><td>25</td><td rowspan="3">AA
BA
BB
CB
CC
DC
DD
F
FX</td><td rowspan="3">90-100
85-89
80-84
75-79
70-74
60-69
50-59
0-49
Both absent and unsuccessful</td></tr>
<tr><td>Activity Portfolio</td><td>45</td></tr>
<tr><td>Research Paper</td><td>30</td></tr>
</table>

COURSE ASSESSMENT & LEARNING OUTCOMES MATRIX

Assignments	**Course Learning Outcomes**
Reading Responses	#1, #6
Activity Portfolio	#1, #2, #3, #4, #5, #6
Research Paper	#1, #3, #6

Course Schedule*

Dates	**Readings**	**Dates**	**Assigments**
September 29 (Introductions & Syllabus)	*STEM for Elementary School Students – How to Instill a Lifelong Love of Science* by Jackie Gernstein	**September 30**	STEM in Early Childhood Education
October 6	**Moomaw's Book:** Chapter 1: STEM Education	**October 7**	**Moomaw's Book:** Chapter 1: STEM Education
October 13	**Moomaw's Book:** Chapter 2: STEM Learning Centers	**October 14**	**Moomaw's Book:** Chapter 3: STEM Throughout the Classroom
October 20	**Charlesworth & Lind's Book:** Concept Development in Mathematics and Science p.1-34. **Sections from Clements & Sarama (2007)** Early childhood mathematics learning	**October 21**	**Moomaw's Book:** Chapter 4: STEM Outdoors and 2 STEM Activities
October 27	**Charlesworth & Lind's Book:** Concept Development in Mathematics and Science p.1-34. **Sections from Clements & Sarama (2007)** Early childhood mathematics learning	**October 28**	**Moomaw's Book:** Chapter 4: STEM Outdoors and 2 STEM Activities
November 3	**Moomaw's Book:** Chapter 5: STEM in a Project Centered Curriculum	**November 4**	**Moomaw's Book:** Chapter 5: STEM in a Project Centered

	Charlesworth & Lind's Book: Promoting Young Children's Concept Development Through Problem Solving p. 34-52 **Sections from Clements & Sarama (2007)** Early childhood mathematics learning		Curriculum - 2 STEM Activities **Research Paper Check Point 1 : Topic & Introduction (%10 of the grade will be assigned)**
November 10	**Charlesworth & Lind's Book:** One-to-One Correspondence p. 104-116 Number Sense and Counting p. 117-132 Logic and Classifying p. 133-145 Comparing p. 146-155 **Guest Speaker:** Dr. Sinan Olkun *Number Sense*	**November 11**	**Moomaw's Book:** Chapter 6: Quick STEM Activities
November 17	**Charlesworth & Lind's Book:** Logic and Classifying p. 133-145 Comparing p. 146-155	**November 18**	**Moomaw's Book:** Chapter 6: 2 Quick STEM Activities **Charlesworth & Lind's Book:** Early Geometry p. 156-168 Parts and Wholes p.179-187 Overview of Primary Science p.436-449 Physical Science p.466-477 **Activity Portfolio Check Point Sharing (% 20 of the grade will be assigned)**
November 24	**Charlesworth & Lind's Book:** Basics of Science p. 66-78 How Young Scientist Use	**November 25**	**Moomaw's Book:** Chapter 6: Quick STEM Activities

	Concepts p. 79-90 Planning for Science p.90-p.102		**Research Paper Check Point 2 : Review of the literature (%10 of the grade will be assigned)**
December 1	**Charlesworth & Lind's Book:** Ordering, Seriation, and Patterning p.216-230 Measurement p.231-242 Intrepreting Data Using Graphs p.256-264	**December 2**	**Moomaw's Book:** Chapter 7: STEM-Based Field Trips and 2 STEM Activities
December 8	**Charlesworth & Lind's Book:** Language and Concept Formation p.188-197 Fundamental Concepts in Science p.198-214 Applications for Fundamental Concepts in Preprimary Science p. 265-274	**December 9**	**Moomaw's Book:** Chapter 7: STEM-Based Field Trips **Charlesworth & Lind's Book:** Overview of Primary Science p.436-449 Physical Science p.466-477 Life Science p.450-465 STEM Area Activity in an Early Childhood Setting
December 15	**Charlesworth & Lind's Book:** Life Science p.450-465 Earth and Space Science p.478-490 Health and Nutrition p.499-512	**December 16**	**Moomaw's Book:** Chapter 7: STEM-Based Field Trips and 2 STEM Activities
December 22	**Chapter 6 in Donohue (Ed.)** *Connecting child development and technology: What we know and what it means*	**December 23**	**Moomaw's Book:** 2 STEM Activities

	Chapter 11 in Donohue (Ed.) *Stepping into STEM with young children: Simple robotics and programming as catalysts for early learning*		
December 29	**Chapter 17 in Donohue (Ed.)** Connected educator – Connected learner: The evolving roles of teachers in the 21st century	**December 30**	Course Reflections & **Activity Portfolio is due**

**This syllabus and schedule are subject to changes.*