

**Teaching Sciences in the Elementary School**  
**15:256:554 (01)**  
**3 Credits**

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<u>Phone Number:</u> 732-672-9432	10 Seminary Pl, Rm 013
<u>Class times:</u> Wednesday 4:50 pm to 7:30 pm	<u>Classroom:</u> 025 A
<u>Office Hours:</u> by appointment	
<u>Mode of Instruction:</u> <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Seminar <input type="checkbox"/> Hybrid <input type="checkbox"/> Online <input type="checkbox"/> Other	<u>Permission required:</u> <b>Yes</b>

**Introductory remarks**

This course is intended for future elementary and middle school teachers who will teach science (among other subjects). The goal of the course is to introduce possible approaches to science education at the elementary/middle school level consistent with the national and state Science Education Standards. In addition, students should become more familiar with science content taught at the elementary/middle school level and science equipment used in these classes.

I believe that a passionate and knowledgeable teacher can lead her/his students on the path to discovery, curiosity and rational reasoning. I want you to be this kind of teacher. I will help you build the knowledge and share my passion but you will need to contribute your passion to your development. I believe that every student who comes to me to become a teacher wants to be the best teacher she/he can be, so I will operate under this assumption.

The course will help you learn a new approach to teaching and will help you start the personal shift from a student to a teacher. Your participation in class discussion, your persistence in the completion of assignments, your creativity and enthusiasm will ultimately determine what kind of teacher you will be. To be the best teacher YOU can be, make sure that you treat your work on each assignment as a step towards this goal, not busy class work.

In addition, another goal of the course is to help you understand the epistemology of science and its implications to science instruction. Epistemology is the study of the construction of knowledge. Basically in this course you will learn how scientists know what they know, how they approach problems and how they decide what to keep and what to discard. We will focus on the process that lead to many scientific discoveries and principles that we teach our students and how learning of our students sometimes resembles that of real scientists.

**Learning goals**

The learning goals of this course are that you, as future teachers, should eventually be able to:

- Plan science lessons, units and learning sequences
- Collaborate with other students to evaluate, modify and try already made science lessons
- Design and implement science lessons using inquiry-based teaching
- Become familiar with both NGCSS (including framework, crosscutting concepts and organization) and the NJCSS.
- Develop content knowledge, skills, as well as scientific attitudes in ALL scientific areas (physical

- Critically reflect on your teaching in order to improve it.
- Develop critical reflection skills
- Provide proper feedback to others so that they can improve their teaching

### Course catalogue description

Science in the Elementary School (3 credits): Presents science as an integrated body of knowledge using investigative and inquiry techniques. Thematic or problem-based approach to science teaching. Impact on the elementary school of new developments in science and new refinements in the teaching of science; emphasis on content, method, material, and general curricular implications.

### Class materials each student needs to have/buy/bring to class:

- **Mandatory textbook:**

**Teaching Science for all children: Inquiry methods for constructing understanding (4<sup>th</sup> Edition).**  
**By Ralph Martin, Colleen Sexton and Teresa Franklin**  
**Pearson Higher Education**  
**Publication Year: 2009**  
**ISBN 0-205-59351-8**  
**Available at the Rutgers Bookstore**

- Additional readings (will be available on the course website, save a copy on your computer or print)
- Next Generation Science Standards (save a copy on your computer)
- New Jersey Core Science Standards (save a copy on your computer)
- Colored pencils (pack of 12 or 24)
- Notebook with graph paper or sheets/pad of graph paper to insert in a binder (pack of 100)
- Ruler
- Scissors

### Grading and Activities

Your course grade will be based on several different items. This syllabus offers an outline of the items, however it is not set in stone and adjustments may be made throughout the semester in order to meet our needs. You will be informed of any changes either in class or by email.

Hard work, attendance to all classes, completion of all the assignments, participation in class activities/discussions and resubmission of the assignments are all factors considered for the attribution of the final grade for this course. To obtain full credit for any academic task, each student must show signs of dedication to extending his/her scientific knowledge as well as constant academic effort aimed toward improvement and individual scientific knowledge and skills development. The more work you dedicate to the course, the more you will get out of it.

Below is an outline of class activities. The goals of this course are to learn and practice techniques for teaching and transition from student to teacher and each assignment is designed to help you meet these goals. **Therefore, each assignment can be improved by submitting the assignment again, and I encourage you to do so.** After you submit each assignment, it will be scored, and feedback may be provided (depending on assignment). Once the assignment is returned to you, you may then work to improve it. All resubmissions are due before the next class after the work is returned

<b>Activities</b>	<b>points</b>
• Lesson Plan	10
• Unit Plan with assessment	15
• Teaching and teaching preparation	10
• Pre-reflection and final reflection	15
• Weekly assignments	15
• Lesson Plans (4 times throughout the semester - 5 points each)	20

- Weekly Quizzes 10
- Science Surveys 5

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**Total 100**

**Description of activities**

Participation in class discussions: Class work will be primarily group work. You will work to explore and learn various components of science that is often taught at the elementary and middle school level. At the same time you will learn how students construct similar concepts. We will also discuss the readings that you will do at home.

Try not to miss any class meetings because it will be difficult (almost impossible) to learn the material on your own. You are welcome to express any opinion you have, and ask any questions regarding the material but make sure this is done in a respectful and professional manner. You are expected to show up, contribute to discussions, use technology for class work only, and stay off of your cell phone while in the classroom. If you need to miss class for any reason, please email me as soon as possible. Unsatisfactory participation and **any** unexcused absences will negatively affect your course grade.

Lesson Plays: Four times throughout the semester, you will be asked to write a lesson play for a prompt given in class. Full directions for this assignment will be given in class.

Quizzes: At the beginning of each class, you will take a short quiz. Each quiz will address one or more standards and be related to science content. You will receive the your scored quiz by email by Monday. It is your responsibility to make any corrections to the quiz and resubmit it by the next class. If you have any questions regarding your quiz, we can talk about it during office hours.

When resubmitting an assignment, you must do three things:

- 1) Identify the difficulty you had
- 2) Provide a new answer
- 3) Explain why this answer is correct

Weekly homework assignment: Each week you will complete a homework assignment related to one of the topics we discussed in class. Most weeks, you will be responsible for complete a part of a lesson plan related to the content covered. Each week, the homework is due on Sunday by midnight. It should be emailed to me. Once I receive it, I will provide feedback and send it back to you. You may be asked to do revisions. Revisions are due by the next class.

Lesson plan and teaching: Once toward the end of the semester you will work in pairs to teach a lesson of elementary school length (approximately 30 minutes) on a topic that you select with guidance from the instructor. You will create a lesson plan, teach then lesson and then revise the lesson plan after receiving feedback from your classmates and the instructor. The final lesson plan will be in the GSE format (with some modifications) and will be posted on the course website so that your classmates can use it.

Unit Plan: You will be required to create a unit plan with final assessment. More information will be provided in class

Pre-reflection and final paper: At the beginning of the course, you will be asked to write a reflection on your experiences with learning science. Upon completion of the last class, you will write a final reflection in which you will describe your philosophy of teaching science, and how your philosophy has changed throughout the semester. This paper should be approximately 4-5 pages in length and submitted by Sunday following the last class

1	<p><b>Science Method:</b> The nature of science and the goals of science education. The structure of scientific knowledge.</p> <p><b>Content:</b> What is a scientist? What is science? Scientific Methods</p>
2	<p><b>Science Method:</b> Standards, Learning Progressions</p> <p><b>Content:</b> Measurement, relations between variables</p>
3	<p><b>Science Method:</b> Inquiry based science teaching</p> <p><b>Content:</b> Motion</p>
4	<p><b>Science Method:</b> Goal setting, designing assessments that meets lesson objective;</p> <p><b>Content:</b> Dynamics 1</p>
5	<p><b>Science Method:</b> Asking the right questions, questioning</p> <p><b>Content:</b> Dynamics 2</p>
6	<p><b>Science Method:</b> Lesson Plans, evaluating and modifying already made lesson plans</p> <p><b>Content:</b> Light, Night and Day, Phases of the moon</p>
7	<p><b>Science Method:</b> Evaluation and assessments</p> <p><b>Content:</b> Seasons, Solar System (Teaching 1)</p>
8	<p><b>Science Method:</b> How to design assessments</p> <p><b>Content:</b> Ecosystems (Teaching 2)</p>
9	<p><b>Science Method:</b> How to design unit plans, sequencing</p> <p><b>Content:</b> Genetics and heredity</p>
10	<p><b>Science Method:</b> Teaching all learners</p> <p><b>Content:</b> Rock Cycle, Types of Rocks (Teaching 3)</p>
11	<p><b>Science Method:</b> Reflection and Metacognition – Self-reflection and Student to Teacher Reflection</p> <p><b>Content:</b> Model of the interior of Earth, Earthquakes, Tectonics</p>
12	<p><b>Science Method:</b> Using technology</p> <p><b>Content:</b> Magnetism (Teaching 4)</p>
13	<p><b>Science Method:</b> Teacher Evaluation</p> <p><b>Content:</b> Electrostatics</p>
14	<p><b>Science Method:</b> Question and Answer session; Portfolios, Interviews, and Resumes</p> <p><b>Content:</b> Circuits</p>

## **ACADEMIC INTEGRITY POLICY**

Please comply with standards of academic integrity in this course. For the homework/assignments, you are allowed to work with your classmates; however, submitted works should be of your own. For the exams, you are not allowed to work with or request help from anyone. The consequence for violating policies of academic integrity and other elements of the student code of conduct are serious and can have a tremendous negative impact on your academic progress and future career. Please familiarize yourself with the university policy on academic integrity:

<http://studentconduct.rutgers.edu/academic-integrity>

Please refer to the Policy on Academic Integrity for Undergraduate and Graduate Students at <http://academicintegrity.rutgers.edu>.

The University Code of Student Conduct can be accessed at:

<http://studentconduct.rutgers.edu/university-code-of-student-conduct>

Related regulations may also be found in the Rutgers Graduate School of Education Catalog. Clear evidence of violation of academic integrity policy may result in a grade of *F* for the assignment AND the course.

## **OR SIMPLY....**

1. Provide proper citations for all materials that you use in the course.
2. Make sure that the work you hand in is your own.