RUTGERS
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Learning and Teaching
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Rutgers, The State University of New Jersey
11:300:450:01 and 15:256:550:01 Biology and Society
Mon. 10:55-1:35 @ Lipman Learning House
Fall 2016, 3 Credits

Instructor: Ron Rinehart	Email ravit.duncan@gse.rutgers.edu
Phone Number : (848) 932 0792	Location: 10 Seminary Place; Room: 222
Office Hours: by arrangement	Prerequisites or other limitations: *Admission to the Teacher Education Program*
Mode of Instruction: ___Lecture _x_ Seminar ___Hybrid ___Online ___Other	Permission required: _x_ No __Yes Directions about where to get permission numbers:

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentations: hhttps://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.

This course addresses the following New Jersey Professional Standards for Teachers (2014)[1]:

Standard Four: Content Knowledge. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches, particularly as they relate to the Common Core Standards and the New Jersey Core Curriculum Content Standards and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.

[1] http://www.state.nj.us/education/code/current/title6a/chap9.pdf

Standard Five: Application of Content. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

Standard Six: Assessment. The teacher understands and uses multiple methods of assessment to engage learners in examining their own growth, to monitor learner progress, and to guide the teacher's and learner's decision-making.

Standard Eight: Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.

COURSE LEARNING GOALS[1]

- Students will be able to describe the processes by which scientists develop scientific knowledge, referencing core practices such as modeling and argumentation.
- Students will be able to apply the process described above in the context of an inquiry project of their choice. Students will develop a research question, explanatory model, and experiments to test the model
- Students will write up their inquiry project studies using scientific reporting standards as evident in research journals.
- Students will develop a vision for teaching inquiry in the classroom as well as a set of criteria that they will use to critique lesson plans

COURSE CATALOG DESCRIPTION:

This course is an introduction to the nature of scientific knowledge and practice in the biological sciences and the implications for instruction. Science is about building models and theories to explain natural phenomena. It is about using observations and experimentation to construct evidence-based models that are creative, tentative, and in many ways subjective. These models are then subject to critique and argumentation by the scientific community. In this course we will learn about scientific inquiry and develop a vision of how an inquiry-based classroom operates.

We will therefore begin with an exploration of the nature of scientific inquiry in biology and why we should teach it. We will also examine the goals of biology education and related standards at the national and state level. During the course of the semester we will learn about inquiry-based approaches to science education that emphasize not only the learning of scientific concepts but also learning about the nature of scientific inquiry.

[1] These can be TEAC claims or objectives from other sources.

GRADING POLICY:

Assignment	Tentative due date	Grade
Participation (individual)	Throughout the course	30%
Scientific article review (individual)	Throughout the course	10%
Lesson critiques (individual & group)	Throughout the course	20%
Activity development (individual & group)	Week 14	20%
Individual reflection paper (individual)	Week 15	20%

ASSIGNMENTS[2]:

Participation: Your participation in class counts heavily towards your grade. It is therefore important that you actively participate in class activities and discussions. Learning is an active process: the more you participate the more you learn. As part of your participation you are expected to read assigned readings, actively engage in class discussion and group work activities.

Readings: There will be assigned readings for each class session; you are expected to read them and be prepared to discuss them in class (part of participation grade). Often I will assign a question or two to guide and focus your thinking as you read the assigned papers. On occasion an additional reading may be assigned or a new reading may be substituted for an existing one.

Scientific article review: As a science educator you are expected to stay well informed of scientific developments in biology. Towards that end you are asked to subscribe (for the duration of one year and in your name) to Scientific American. During the course you will be expected to read and review a major article in this journal (from current or past issues). The review needs to identify the scientific model that is at the heart of the report, the evidence in support of the model and any counter-arguments. You will conduct a brief presentation on the article in class. I also recommend subscribing to Science News a weekly magazine with science updates in short articles that are great for the classroom.

Projects: There are two major activities in this course that will help you develop a better understanding of science on the one hand, and begin to develop your ability to design effective instruction. The first activity involves the critique and revision of existing lessons. This activity will be done partly in groups and partly individually. During several points in the course you will be asked to critique and revise an existing lesson. As a class we will develop criteria for judging the merits and shortcomings of inquiry-based lessons. The second activity involves the design of a short lesson in which students have to either develop or evaluate models based on provided evidence. You will work in groups to develop this activity based on "templates" that you will encounter in class. As a group you will present this activity during the last class.

Individual reflection paper: The last assignment of this course is an individual reflection paper 3-5 pages long in which you (individually) reflect on what you have learned in this course. This reflection should be based on the contribution of the readings, class activities, and final project to your developing understanding of what it means to teach biology effectively.

Academic Integrity Policy: Please make sure to properly cite all academic sources (citations of articles, books, etc) in your assignments.

[2] Including exams, papers etc.

COURSE SCHEDULE

Week 1 - Introduction

Subscribe to Scientific American http://www.sciam.com/

Week 2 - Scientific Inquiry I

Donovan, M. J., & Bransford, J. D. (2005). *How Students Learn: Science in the Classroom*. Washington, DC: National Academy Press. Introduction and (1-21) Chapter 9 (397-416)

Week 3 - Scientific Inquiry II

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Academy Press. Page 1- 4 (Summary) and pg 23-37 (Chp 2)

Week 4 - Scientific Inquiry III

Windschitl, M. (2008). What is inquiry? A framework for thinking about authentic scientific practice in the classroom. In Science as inquiry in the secondary setting. (pp. 1-20). Eds. Luft, J., Bell., Gess-Newsome, J. NSTA press, Arlington, Virginia.

Week 5 Lesson critique I

Windschitl, M & Thompson, J. Teaching about science ideas as models. University of Washington (1-11)

Week 6 [- Cancer inquiry I

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Academy Press. Chp 3 (read half-- 41- 63)

Week 7 - Cancer inquiry II

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Academy Press. Chp 3 (read rest of chapter)

Week 8 - Cancer inquiry III

Scientific American, "Chromosomal Chaos and Cancer," by Peter Duesberg, May 2007, p. 52-59 [access online via library].

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Academy Press. Pg 139-169 Life Science DCIs- read LS1& LS2.

Week 9 - Lesson critique II

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Academy Press. Pg 139-169 Life Science DCIs, read LS3-4

Week 10 - Sci Am Poster fair and evolution debate

Mirsky, S. (2006 Feb). Teach the Science. Scientific American.
http://www.scientificamerican.com/article.cfm?id=teach-the-science

Rinehart, R., Duncan, R. G., & Chinn, C. A. (2014). A scaffolding suite to support evidence-based modeling and argumentation. *Science Scope*, 38(4), 70-77.

Week 11 - Inquiry in the classroom I

Tang, X., Coffey, J., Elby, A., & Levin, D.M. (2010). Scientific inquiry and scientific method: Tensions in teaching and learning. *Science Education*, 94 (1), 29-47

Week 12– Inquiry in the classroom II

Lucas, D., Broderick, N., Lehrer, R., & Bohanan, R. (2005). Making the grounds of scientific inquiry visible in the classroom. Science Scope, 29 (3), 39-42.

Reiser, B.J., Berland, L.K, & Kenyon, L**. (**2012). Engaging students in the scientific practices of explanation and argumentation. *Science Scope*, *35*, 6-11.

Week 13– Inquiry in the classroom III

Windschitl, M. (January, 2006). Why we can't talk to one another about science education reform. *Phi Delta Kappan*. 87 (05), 348-355.

Week 14 - Inquiry Activity

Reading TDB

Week 15 - Activity Poster Fair
No readings; Present inquiry activity; Reflection papers due