RUTGERS
Graduate School of Education

Learning and Teaching
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Teaching Internship Seminar (Physical Science Section)
15:255:536:04:03769
3 Credits

Instructor: James Flakker	Jim.Flakker@gse.rutgers.edu
Phone Number 201-213-6746	10 Seminary Pl
Office Hours: by appointment	Prerequisites or other limitations: A student should be in an EdM+Cert degree program in physics/physical science
Mode of Instruction: ___ Lecture __X_ Seminar ___ Hybrid ___ Online ___ Other	Permission required: _x_ No __Yes Directions about where to get permission numbers: from the instructor

Learning goals
The goals of the course are to learn how to plan, implement, and reflect on classroom instruction in physics/physical science that engages all students in productive and meaningful learning of physics content and practice. Achievement of those goals includes mastering time management, emotional control, physics experimental skills, listening to students, and, most importantly, communication skills (communication with students, cooperating teacher, parents and school administration). Additional goals include continued improvement of one's own physics understanding and acquisition of additional strategies that engage diverse learners in mastering physics (content and practices).

Course catalogue description

The goal of the course is to support student teaching of pre-service physical science teachers. The course will focus on listening to the students, preparation of unit plans, lesson plans, development of assessment instruments and learning to use them, experimental design, and reflection on teaching.

Class materials:
Etkina, E. Gentile, M., Van Heuvelen, A. College physics (with the ALG and Instructor Guide). San Francisco, Pearson, 2013.
Next Generation Science Standards
R. Knight. "Five Easy Lessons", San Francisco: Addison Wesley, 2003.
A high school text that you are using in your school. PUM modules, diagnoser.com

Grading and Activities Your course final grade will be based on attendance, participation in the discussions, reflection on teaching, lesson plans, quizzes and exams that you will design, video analysis of your lesson, a research project, and teaching portfolio. Each assignment can be improved, as many corrections as needed are encouraged. Note that I will not assign you a course grade before you submit all required portfolio items (teaching philosophy, classroom management plan, lesson and unit plan, and parent-teacher reflection).

Activity	**Total points**
Attendance, participation	100
Reflection on teaching	100

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Screencasts	100
Unit and lesson plan	100
Debate	100
Research on student learning	100
Teaching portfolio	100
Grand Total	**700**

Description of activities

Attendance, participation in class discussions: Each week you will meet and discuss your experiences during student teaching, design lesson plans, assessment activities, and how to use equipment. Attendance and participation is these meetings will be a basis for your course grade. In addition in every class we will spend 1 hour working on the learning and teaching of the content that we did not touch in our previous classes.

Reflection on teaching: You will keep a reflective journal during your teaching. It should consist of two parts: pre-post teaching reflection on one lesson per day; reflection using 4-5 rows of the rubric for self-assessment of teaching and the RTOP for that lesson. Make sure that you write reflections EVERY day; do not save them for Saturday. The most difficult thing is to record what student understanding looked like, so do not wait till you forget it! At the end of the week, you will choose ONE lesson that went well and ONE lesson that did not go well with the analysis to e-mail to Eugenia on Sunday night. Although you will be sending two lesson reflections, you should write reflections every day.
Components of the reflection: Before teaching 1. What do I plan to accomplish? 2. How will I know that students are learning? 3. What are the strengths of the students that I plan to build on? 4. What are potential weaknesses? After Teaching: 1. What did I accomplish? What were my strengths and weaknesses? 2. What did student understanding look like? A specific example of what a student said or did that showed you that the student understood. 3. What were their strengths? A specific example. How do you plan on building on those? 4. What were their weaknesses? A specific example. What did you do or what you planned to do about those? 5. What would I change in the lesson next year?

Unit and Lesson plan: At the beginning of the semester you will design a unit plan for a unit that you will teach later, with a detailed lesson plan of one of the lessons. After you teach the unit you will write a detailed reflection on it, including the reflection on one lesson whose lesson plan you submit. We will discuss the unit and lessons in class, and later discuss the results of formative and summative assessment. Student work without names should be provided for one formative assessment of that unit and the final summative assessment. You will bring student work to class with the examples of your feedback. Deadline for a complete unit and lesson - November 1st. The unit and lesson plan will be uploaded on the Sakai website.

Screen casts You will make 2 screen casts during student teaching: in one screen cast you will record an example of solving a problem for your students so they can use it as a guide when they solve problems in a particular area, and the second one will be an example of feedback that you will make for your students when you feel that the whole class will benefit form this feedback. For both screen casts in a separate document you will need to provide a justification why you chose these particular topics/problems/feedback, etc. when you e-mail me the link to the screencast, you need to attach the corresponding document.

Debate In mid November we will have a debate in class - should we or should we not use nuclear energy. Your task is to prepare the arguments on both sides and be ready to join one side or the other during the debate. Debate will be held during the last week of class.

Research on student learning You will learn how to do action-based research using the data collected form your students. For this you will use the unit test (either for the unit you design or the unit that your cooperating teacher taught). You will make a rubric for important concepts/skills that you wish the students to attain at the end of the unit, use this rubric to analyze their responses in detail, write a summary of your findings and suggest what should be done in the next unit/next year.
Assessment instruments: You will use two of your assessment activities included in the unit (one summative and one formative) during class discussions. You will need to make copies of your student work with no names and use the copies for analysis in class. The activities themselves should be e-mailed to the members of the class in advance.

Teaching portfolio: At the end of the course you will upload all of the documents that are required for your teaching portfolio. These include the teaching philosophy statement, unit and lesson plan, parent-teacher conference document, and classroom management plan.
Academic integrity: Make sure that you provide proper citations for all materials that you use in your lesson and unit plans.
Course website: Materials for class will be posted on the class website; after you get the e-mail about the posting; you are responsible for printing them and bringing a copy to class.
Course Schedule: Please read carefully, where is says bring examples to class – make sure you either have copies for everyone.

Topics for Discussions (by week)

PTS - Professional Teaching Standards; NSCS - National Science Content Standards, NJCCCS - New Jersey Core Curriculum Content Standards

Week	Topic	Assignment (Ch)	PTS	NSCS	NJCCCS
1	Different types of lessons. Rubrics for self assessment Planning of kinematics unit.	Ch. 1, 2,	PTS Standard II: i (2). PTS Standard II: ii (1).	A, B, E	5.1 All; 5.2E
2.	Next Generation Science Standards and Games in a physics class. Planning of dynamics unit.	Ch. 5	PTS Standard II: i (2). PTS Standard II: ii (1).	A, B, G	5.1 All; 5.2E
3.	How to work with a textbook. Reading though interrogation. Planning of momentum unit.	Ch. 5	PTS Standard V: iii (3).	A, B, G	5.1 All; 5.2E
4.	Reading and understanding student work. Bring examples to class. Planning of statics unit.	Ch 5	PTS Standard V: iii (3).	A, B, E	5.1 All; 5.2E
5.	Observations of teaching. Danielson framework. Planning a vibrations unit.	Ch 20, 21	PTS Standard II: ii (4).	B, F, G.	5.1 All; 5.2C
6.	Pre/post/gain.	Ch. 1-4;	PTS Standard	B	5.1 All;

	Conceptual tests - Force Concept Inventory and Conceptual Survey of Electricity and Magnetism. Planning waves unit.	14-18; 20. 21	II: ii (4)		5.2C
7.	Visit to the MSLC. Using RTOP to assess your teaching. Planning geometrical optics unit.	Ch. 20, 21	PTS Standard V: iii (4).		5.1 All; 5.2All
8.	Formative assessment - theory and reality. Planning geometrical optics unit.	Ch. 20-21		B	5.1 All; 5.2C
9.	Interpreting student work. Writing in a physics class. Bring examples to class. Planning wave optics unit.	Ch. 22	PTS Standard V: iii (3).	B	5.1 All; 5.2A&B
10.	Students of diverse needs - changing a lesson plan in optics.	Ch. 20-22	PTS Standard II: ii (1), VII: iii (5)		
11-13.	Examples of student problem solving, your diagnostic and your further actions. Bring examples to class.	Ch. 23	PTS Standard III: iii (2,3), IV: I (3), ii (2), VI: iii (3,4,5), VIII: iii (5)		
14.	Meet the parents. Strategies for successful interactions. Reflection on teaching.	Ch. 23		A, B, E, F, G	5.1 All; 5.2 All
15	Nuclear power debate				

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Rubrics for self-assessment of teaching

Below is a list of abilities that you need to develop during student teaching. You can use the rubrics below to plan your lessons and self-assess them. Your cooperating teacher will have the rubrics too.

Ability	**Well developed**	**Working towards it**	**Missed opportunity**
	3	**2**	**1**
To start a lesson in an organized productive way	Students start working from the first second, everything is planned and no time is wasted.	The first seconds are spent unproductively but the lesson got on track within the first 3 min.	The beginning of the lesson did not lead to the organized, inspired work.
To create motivation for student learning	The content of the lesson is connected to student lives, or there is an interesting question, or motivation is created based on student success, students understand why they are doing what they are doing.	There is some attempt to motivate students but many do not know why they are doing what they are doing.	Motivation is based on "need for the test" or is absent.
To keep track of what every student is doing	The teacher scans the classroom often and notices subtle details of student learning activities and behavior; most students participate in the lesson and speak.	The teacher follows most of the students but misses a few, the omissions do not lead to the disruption of the lesson.	The teacher does not notice a crucial moment/s that leads to the disruption of the whole lesson; few students participate.
To help students develop study habits	A great deal of attention is given to building study habits: taking notes, planning learning, metacognition, drawing sketches and graphs, asking productive questions, time management.	Some attention is given to building study habits but it is not systematic.	No attention is given to study habits.
To use the board strategically	The board is a productive teaching tool that helps students organize their notes and follow the lesson,	The board is used but things are erased often, no ruler to draw graphs and other	The board is used randomly, it is clear that the teacher did not think it

	writing is clear, large letters, a ruler is used for the drawings and the whole lesson fits on one board.	pictures, hard to follow.	through.
To organize experimental work effectively	The experiments shown by the teacher are easy to see, students understand the point and either record and explain or predict, observe and reconcile. Experiments for the students are planned, who goes where and when is clear, no time is wasted, equipment is appropriate and works well	Experiments done by the teacher work well but student participation is minimal, the purpose is not clear. Student experiments are planned but student work is not well thought through beforehand, time is wasted.	Teacher experiments are hard to see, the discussion is limited. Student experiments are not thought through – either time is wasted, students are disorganized or the physics point is lost
To organize whole class discussion effectively	The teacher guides the discussion but does not dominate it, the summary is clear, lots of student-student talk, pauses for the students to take notes, main points are summarized on the board.	The discussion is two way mostly teacher-student-teacher, all summaries are done by the teacher, no time to take notes, the board is sketchy.	The teacher talks most of the time, students respond yes or no, the board is not used, no time or attention to notes.
To organize group work effectively	Students are used to working in groups, they arrange quickly, the teacher moves among the groups and group assignments are open-ended enough to promote fruitful discussions, white boards are used and all students participate; at the end there is a debriefing.	Students are used to working in groups but it takes some time to settle or group tasks are focused on one right answer, or white boards are not used productively, the teacher spends too much time with one group.	Students are not accustomed to working in groups, many do not participate, no debriefing, the teacher does not attend to all groups.
To manage time	A productive **sense of**	The pace is	The lesson

effectively	**urgency** is present, timing for activities is announced, the change of types of work occurs often but not too often.	either too slow or too fast.	drags.
To lead reflection effectively	All students participate, the reflection is focused on the important issues.	Few students participate, some comments are not useful.	Students reflect on non-important issues.
To assign homework effectively	The homework helps reinforce the past lesson or prepares for the future lesson, it is meaningful and instructions are clear.	The purpose of homework is unclear but the instructions are present.	No homework or no instructions.
To listen to the students	The teacher listens and responds to student comments productively.	The teacher listens but some responses are not productive.	Student comments are not noticed or ignored.
To use multiple representations	Multiple representations are used and are used productively.	Some representations are used productively.	Few representations are used and the purpose is unclear.
To use technology	Technology is used strategically.	Technology is used strategically sometimes.	Technology is used but is not really needed to improve learning.
To pose productive questions and to respond to students' questions	The questions are high level, responses to student questions are done through reflective toss technique, they lead to deep thinking, no wrong physics answers on the teacher's part.	The questions are mixed, students questions are answered directly, the teacher's physics is correct.	The questions are mostly yes/no, students' questions are ignored, or teacher's responses have incorrect physics.
To encourage students to generate productive questions	There is a mechanism through which students learn to generate good questions, the teacher models how to ask good questions, the atmosphere in class is	Students questions are rare but are treated with respect	There are no students questions.

	conducive to students asking questions.		
To generate explanations	Students are continuously encouraged to explain and devise mechanisms for evidence; students, not the teacher, evaluate provided explanations, students are encouraged to argue their point of view and multiple points of view are tolerated as long as the explanations are logical; the explanations provided by the teacher are correct from the physics point of view.	Students sometimes are pressed for explanations but not always, the teacher evaluates explanations by saying good or ok, instead of tossing them back to students, the explanations provided by the teacher are ok but not really deep.	The teacher does not press for explanations, argumentation is not encouraged, phenomena are analyzed macroscopically, mechanisms are missing, the explanations provided by the teacher have physics mistakes.
To build the lesson on students' ideas	The lesson plan takes into account student ideas documented in research and learned in course work and the lesson is continuously modified based on students' ideas emerging during the lesson	The lesson plan takes into account student ideas documented in research and learned in course work and but during the lesson students' ideas are largely go unnoticed	Students' ideas are not taken into account during the planning stage and are not used productively during the lesson.