Physics 310: Readings for Teaching High School Physics

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Office Hours: (by appointment)

Course Meeting Times:

Lab: W Moulton Hall Room 214, 5:30pm - 8:30pm

Course Goals:

This course provides essential background for teaching high school physics that centers around developing scientific literacy in students. It will provide students with philosophical and pedagogical background in the teaching of physics. The course as such is built around both pedagogical knowledge - a knowledge of generic teaching practices - and pedagogical content knowledge - a knowledge of how to actually teach the content of physics. Physics content knowledge per se is assumed.

This course is based on the belief that teachers must act on grounded principles, and not arbitrarily. What teachers do as they present their lessons should be rooted deeply in their attitudes about issues that concern them, their students, the scientific profession, and society -- balancing declarative knowledge with procedural knowledge, balancing expository teaching with inquiry learning, balancing depth of coverage with breadth of content, emphasizing learning over teaching, and knowing what values and knowledge are worth learning in light of national and state standards, and the needs of the student and society. The goals of imparting such attitudes are to improve the educational process, enhance the achievement of the learner, produce better and more productive citizens, and improve society. The aim is to prepare all students for life in a democratic society. This course provides essential background for PHY 311 -- *Teaching High School Physics.*

Methodology:

This course will have a learning environment that is student centered, knowledge centered, assessment centered, and community centered. This course will be **student centered** to the extent that the teacher builds on knowledge students bring to the learning situations. This course will be **knowledge centered** to the extent that the teacher helps students develop an organized understanding of important concepts in the physics teaching discipline. This course will be **assessment centered** to the extent that the teacher makes students' thinking visible so that ideas can be presented and verified. This course will be **community centered** to the extent that the teacher establishes classroom norms that learning with understanding is valued and students feel free to explore what they do not understand.

Emphasis will be placed on an **Assessment-for-Learning Policy**. That is, assessments of student performance will be used not only to assign grades, but to improve student performance. Unsatisfactory work will be returned to the student for improvement. A student's scores can be improved following

appropriate revision and resubmission of "unsatisfactory" course projects, so long as deadlines are met. Note: The Assessment-as-Learning policy does not apply to examinations and reading quizzes. Consistent with the Assessment-as-Learning Policy, students are encouraged to write drafts of essays or other projects, submit them for review by the course instructor, and make revisions based upon the instructor's written comments prior to the submission deadline. Please keep in mind that the very best papers/projects in this course typically have been produced by students who submit their papers/projects for review 2 to 3 times before submitting the final copy. Electronic attachments are the preferred form of submission. Please allow at least two school days for turn around once submitted for review.

This is a "readings heavy" course; students must keep up with daily reading requirements. The amount of reading increases toward the end of the course. Therefore, reading ahead and taking notes is strongly encouraged. This course can be overwhelming due to the heavy work load; don't fall behind. During a recent semester, 3 students out of 15 earned grades of F due to a failure to keep up.

Group Work:

Students are encouraged to discuss the readings with each other and assist and give feedback to students as they create their papers and presentations. However, each student must turn in his or her own unique papers and projects.

Notebook:

Students must keep an ELECTRONIC Notebook in which they record a running bibliography of each assigned reading, their notes as they read, and their ideas and questions for class discussion. (These 3 things are all important.) Your notebook should be updated weekly by 4pm Wednesday via the file drop in reggienet. A weekly grade - half on completion and half on ideas and questions showing deep reflection. Students may resubmit ideas and questions following a class for more points in this category, but these resubmissions will be expected to be at a higher level because we will have already discussed the topic. Resubmissions should be submitted by the following week via reggienet and clearly labeled as such.

Grading/Assessment:

In this course, as in other Physics Teacher Education courses, emphasis will be placed on an **Assessment-for-Learning Policy**. That is, assessments of student performance will be used not only to assign scores, but to improve student performance. Unsatisfactory work will be returned to the student for improvement. A student's score can be improved by appropriate revision and resubmission so long as all deadlines are met.

Late submissions, i.e. made after the deadline, may be completed but there **may be** up to a 50% penalty assessed for the failure to submit on time. This policy does NOT apply to quizzes and tests.

Weighting and Grading:

Assignment	% Course Grade
310A: Completion of Physics Knowledge Assessments Project	5%
310B: Participation in class discussions and presentations of your assigned readings	15%
310C: Study group Mentoring and Tutoring	10%
310D: Notebook	20%
310E: 2 Minute Quizzes	5%
310F: Nature of Science Book review	10%
310G: 3 Position Papers	15%
310H: Final Media Project	5%
310I: Final Researched Paper	15%
Total:	100%

The course grade will be determined on the percentage of total score points earned according to the following schedule:

A $\geq$ 90%	82% $\leq$ B < 90%	74% $\leq$ C < 82%	66% $\leq$ D < 74%	F < 66%

The above grading scale might seem a bit high to the student, but it assumes that students will maximize both learning and accomplishments by taking regular advantage of the instructor's **Assessment-for-Learning Policy.** See your course instructor at any time to see where you stand relative to submitted assignments.

Assignments and Specific Criteria:

310A: Physics Knowledge Assessments Project

This project consists of the following: in class complete the assessment quizzes; score the quizzes as homework and report electronically your anonymous results; prior to class review the average results for the class, make a comparison of your results to your classmates and to other school's students (you will find this data in your assigned readings) and be prepared to discuss the results in class; perform a self-assessment of your physics content knowledge and skills, and prepare a Professional Development Plan to remediate the identified deficiencies. The Professional Development Plan will contain the following enumerated components:

1. Section-by-section statement of score stated as a percentage. You must gauge what groupings you want to use (we will discuss these choices too)
2. Section-by-section analysis of knowledge.
3. Detailed (what needs to be done) and specific (how, when, where, and how long) professional development plan for remediation of identified deficiencies. Be certain to include reference to use of the one of the two test frameworks (as appropriate to your major) below used to prepare the state's content examination:

310B: Participating in Class Discussion and Presentations of your assigned readings

Each student will be asked to lead the discussion of several homework readings throughout the semester. It will be that student's job to provide for the class a brief summary of the important parts of the paper, the main conclusions, etc. and to lead the in class discussion. So, the student must have good questions and ideas to discuss about the paper to get the class going. In addition, you will find that leading the discussion is very hard to do if the other students have not read and thought about the text so help your fellow students out by coming prepared to class!

310C: Study group Mentoring and Tutoring

Students must independently complete 10 hours of either free or paid tutoring. They must tutor at least 3 different students and provide their name and contact info so that I can check that they did actually tutor these students. At least 2 of these 10 hours need to be either single one on one or group tutoring, i.e. if you usually tutor in a group you must do 2 hours one to one.

310D: Notebook

Your notebook should be updated weekly by 4pm Wednesday via the file drop in reggienet. A weekly grade - half on completion and half on ideas and questions showing deep reflection. Students may resubmit ideas and questions following a class for more points in this category, but these resubmissions will be expected to be at a higher level because we will have already discussed the topic. Resubmissions should be submitted by the following week via reggienet and clearly labeled as such.

310E: 2 Minute Quizzes

Teacher candidates must complete a number of unannounced "two-minute quizzes" in which they will write two-minute essays responding to a key question regarding an assigned reading. These will be scored as follows: 2 points - In the opinion of the instructor, the student provides convincing evidence of detailed knowledge of assigned reading - clear summary statements were considered in advance of the quiz; 1 point - In the opinion of the instructor, the student has limited knowledge of the reading assignment but has not considered convincing summary statements prior to the quiz; 0 points - In the opinion of the instructor, the student has not read the assignment as evidence by basically restating the title and not providing convincing evidence that the article has been read. Convincing evidence consists of citation of one or more "unique" bits of information found in the reading.

310F: Nature of Science Book Review

Throughout the semester we will be completing several Nature of Science Activities. These range from assigned readings, mini-projects, and small position pieces or presentations. We will have a book review due early in the semester in which you read a book about the NOS and review and reflect on the authors ideas and philosophies.

310G: Three position papers

As we go through the readings students should be thinking about and developing a response to 3 main position or philosophy papers: Their Teaching Philosophy; An Epistemology of Science; and a Scientific Literacy Essay with 1 page emphasis on Physics Literacy specifically. Each paper will have a preparation activity worth 1% each of this grade.

310H: Final Project: Science in Popular Literature and Media

The group will also jointly analyze a piece of science in the media (a book, a podcast, tv show, movie, song, etc. – again checking with me that their choice is acceptable). They will present the accuracy of the science, how it is perceived by the public, and how the media could have improved the presentation of the science to make this perception more correct. Students will be graded on their joint write up of their findings and on their presentation of their work as part of the above presentation of the text. More information on the exact break down of grades on this project and a rubric for grading will be provided closer to the activity.

310I: Final Researched Paper

Students will choose from a suggested list an education research topic and write a researched 5 page paper on this topic. They must have at least 10 cited published sources.

Academic Integrity:

Students are expected to be honest in all academic work. A student's name on any in academic exercise shall be regarded as assurance that the work is the result of the student's own thought and study. Offenses involving academic dishonesty include, but are not limited to the following: cheating, computer dishonesty, plagiarism, grade falsification, and collusion.

Disposition Concerns:

The College of Education, in an effort to ensure top quality graduates, provides faculty members and interested others with the opportunity to provide input into the teacher preparation process. One of these inputs is in the area of disposition concerns. Education faculty, in particular, are encouraged to bring to attention of CECP any significant problems associated with the following major areas. If three or more filed dispositions concerns have not been resolved, the teacher candidate will be blocked from advancing in Professional Studies.

- *Collaboration Issues:* The ability to work together, especially in a joint intellectual effort.
- *Honesty/Integrity:* The ability to demonstrate truthfulness to oneself and to others; demonstrate moral excellence and trustworthiness.

- *Respect:* The ability to honor, value, and demonstrate consideration and regard for oneself and others.
- *Reverence for Learning:* Respect and seriousness of intent to acquire knowledge.
- *Emotional Maturity:* The ability to adjust one's emotional state to suitable level of intensity in order to remain engaged with one's surroundings.
- *Reflection:* The ability to review, analyze, and evaluate the success of past decisions in an effort to make better decisions in the future.
- *Flexibility*: The willingness to accept and adapt to change.
- *Responsibility:* The ability to act independently, demonstrating accountability, reliability and sound judgment.