

Physics 605

Physics Teaching Seminar/Practicum

Spring 2022

1 credit

Instructor: David Newman

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Office Hours:

Monday 4:00-5:00pm in 112 NSCI

Wednesday 2:00-4:00pm in 112 NSCI

[Semester schedule \(calendar\)](#)

This syllabus is located at: <http://ffden-2.phys.uaf.edu/605.spring2021.html>

Course Description

Course content:

This course will give science graduate students both lectures and hands on training in dealing with all aspects of teaching (focused on, but not exclusive to, the Teaching Assistant level and beyond). We will cover topics in teaching pedagogy, preparation strategies, student management, time management and learning assessment. The course will be approximately 50% interactive lecture/ discussion and 50% practical exercises. This course is intended to provide both basic introductory and in-depth science teacher training and guidance at the college level.

Student learning outcomes:

After this course, students will know the basics of good practices in university level science education, will be able to deliver clear presentations, both lecture style and in lab format, will have a variety of tools for classroom management and student encouragement and will have extensively discussed and practiced how to be a good science educator/communicator.

The lectures will be given by a variety of instructors with expertise in the specific areas being covered, as well as by the students themselves. The practical exercise part will consist of preparation and presentation of classroom and lab examples, as well as practice of active learning strategies. Some of these will be taped and critiqued. Every week, time will be reserved for issues

that are brought up by the students who are currently teaching so they can be discussed and solutions proposed by the group. Discussion will be an important part of the course.

- Course participants will have some input in special topics covered. Among the topics covered will be:
 - Teaching pedagogy - including board skills, speaking skills, grading etc. (students will do practice examples of the good and the bad in these areas), engaging students, idea behind active learning and other techniques for engaging and facilitating student learning
 - Preparation - "Why prepare, I know this material!", effective preparation, introducing material, preparing to teach the concepts, preparing to teach the math
 - Time management - Balancing demands, short cuts, using your resources
 - Student/classroom management - starting out right, engaging students, respect, dealing with problems and student issues, cheating, being adaptable, using support
 - Lab preparation and demo development - preparing labs, preparing for the labs, presenting the lab, grading the labs, developing demonstrations for specific topics, reading your audience, encouraging active learning and student participation
 - Learning assessment - making quizzes (lab quizzes etc.), grading, encouraging feedback from students, other forms of assessment
 - Cross cultural issues - teachers from various cultures and students from various cultures, what's acceptable under cultural differences and what is not, sensitivity to differences
 - Ethical issues - plagiarism and other forms of cheating, respect, relationships
 - Working with faculty- getting the most from the experience, asking questions
 - Personal/Professional balance- Being a student at and an employee of the University

• Course Syllabus

Prerequisites: Graduate Standing in a Science Discipline or permission of instructor

Materials Needed:

Required Text: Five Easy Lessons, Author: R. D. Knight, Addison Wesley, 2004

Text:

A New TA's Guide to Teaching Introductory: Physics, Author: K.A. Harper, 2008

Supplemental journal articles DeHaan, R. L., 2005: *The Impending Revolution in Undergraduate Science Education*, Journal of Science Education and Technology, Vol. 14, No. 2, 253-269.
 Halloun, I. A, and Hestenes, D. 1985: *The initial knowledge state of college physics students*, American Journal of Physics, 53, 11, 1043-1048.
 Luft, J.A., Kurdziel, J. P., Roehrig, G. H., and J. Turner, 2004: *Growing a Garden Without Water: Graduate Teaching Assistants in Introductory Science Laboratories at a Doctoral/Research University*, Journal of Research in Science Teaching, Vol. 41, No. 3, 211-233.

Lectures: Note room : M 2:15-4:15 in Room 122 Reich. Building. If you miss the first class, check back here for any changes in schedule.

Assignments: will include reading excerpts from science education text and science education research journal articles as preparation for group discussion and presentation of classroom and lab teaching strategies. Students will also give presentations on topics relevant to course content, which will include preparation of sample work such as quizzes or active learning materials. Each student will give approximately 3 presentations, with supporting sample work, per semester.

Grading: The course will be graded on a pass/fail basis and the grade will consist of the following components (though we reserve the right to make grade adjustments based on performance trends):

Participation 50 %
Presentations 40 %
Sample work 10 %

We will grade on a curve, above 65% will be a passing grade.

Attendance:

Since 50% of the grade for this course is determined by participation, attendance of all lectures and practicum meetings is mandatory. If a student must miss class, they should notify the instructors beforehand or as soon as possible. For approved absences, missed participation work will be made up at the instructors'™ discretion. If a student is absent on a day they are set to present, the presentation will be done at a later class meeting.

Contacting Me: I have office hours as listed above. You can drop by at other times if I'm not busy, or make an appointment. I am (almost) *never* available before class.

Special Needs: The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.

Plagiarism etc: Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or [Student Code of Conduct](#)) defines academic standards expected at the University of Alaska Fairbanks which will be followed in this class. (Taken from the [UAF plagiarism web site](#), which has many links with good information about this topic)

Complaints and Concerns: You are always welcome to talk to me about anything, however, if you have a non-subject matter question or concern that cannot be resolved by me, contact the department chair, Dr. Truffer, Physics Department Office, room 102 NSCI.

Tentative course schedule:

Week Topic
1 Dealing with Students
2 Outreach
3 Practice outreach presentations
4 Teaching issues (New Prof.)

- 5 Outreach presentations
- 6 Time management
- 7 Student/classroom management
- 8 Seminar on planning and assessment from ???
- 9 Certificate program
- 10 Prep for Science demo
- 11 Topic discussion
- 12 Lessons learned during the semester of teaching
- 13 Working with faculty, Personal/Professional balance
- 14 Presentations

Resources from Dr. Fabbri in School of Education:

Next Generation Science Standards

<http://nextgenscience.org/>

Technology Standards

<http://www.iste.org/standards/standards>

Cultural Standards

<https://education.alaska.gov/akstandards/#c3gtabs-cultural>

Quality Matters (online teaching guidelines)

<https://www.qualitymatters.org/> (see also UAF elearning).

Understanding by Design

See attached worksheet

Talk Moves

See attached worksheet

Teacher-Learner Centered Inquiry

See attached worksheet

Other good links that I did not mention but may be useful:

National Science Teachers Association

<http://www.nsta.org/>

UW STEM Teaching Briefs

<http://stemteachingtools.org/tools>

National Science Digital Library

<http://nsdl.oercommons.org/>

National Academies Press

<https://www.nap.edu/> (search science or STEM education)

Last updated **11 January, 2021**