



## Physics 302: Computer Applications in High School Physics Autumn 2016.

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**Office Hours:** Knock on my door or make an appointment by email.

### Course Meeting Times:

Lab: R Moulton Hall Room 307B, 4pm - 6:50pm

### Course Goals:

This course has been designed with the aim of assisting physics teacher candidates to develop a working familiarity with basic computer functions that can be used in inquiry-oriented pedagogy. These are: excel (spreadsheets), power point (presentation software), word and LaTeX (document software), webpage design tools, Phet (free and publically available simulation software in java or flash), IoLab, Pasco, and Vernier probes (several computer data collection tools), other hands on cheap lab equipment.

The goal is to prepare teacher candidates who can:

- create and implement student centered, hands on, discovery/inquiry-oriented labs and activities in their own high school classrooms using standardly available technology.
- assess, utilize, and troubleshoot computers and associated software and hardware to teach physics using inquiry-oriented lab practices.

It is not the intention of this course to make students experts in the use of all available computer-based applications and technology encountered in the most advanced physics classrooms. Rather, the goal is to familiarize students with the basic operations of a few specific processes that they might adapt to any of a wide array of physics units they might encounter as teachers in their own classrooms. And to give the students specific experiences using these to teach a physics content area with TPAC ideologies in mind, i.e. that student teachers must learn a technology and pedagogy within a content area to truly see how it is used in teaching.

### Team Work:

Students are required to work together to accomplish the various tasks in this course. It will be up to you all to effectively work and communicate as a team. If a team member is not pulling his/her weight please contact me outside of class and we can discuss solutions.

## **Grading/Assessment:**

In this course, as in other Physics Teacher Education courses, emphasis will be placed on **Participation** and **Assessment-for-Learning Policy**. That is, assessments of student performance will be used not only to assign scores, but to improve student performance. Drafts and continued improvement of materials will be a large part of the course as will peer evaluation. A student's score on final project submissions can be improved by appropriate revision and resubmission so long as all deadlines are met. Students may return unsatisfactory work in the week following the projects grading. (This does not count for drafted materials which are already graded on a more lenient scale.) Given that we will be often revising and reworking materials in groups during the class time. Late submissions will not be acceptable.

## **Projects for the Semester:**

- **Excel for Teaching Physics (Week 1 & 2)**
- **IoLab Project (Week 3 - 6)**
- **Phet Simulations (Week 7 - 9)**
- **Project Based Learning (Week 10 - 12)**
- **UTube Video Learning Project ( Week 13 & 15)**
- **Webpage Design (Week 15 & 16)**

## **Weighting and Grading:**

**50% in class participation each week on the project.**

**50% Homework each week for the project – examples of the assignments are: written reflections, presentations, or created teaching materials. These will be scored simply as (0-None, 1 – Needs major improvements, 2 – Good, 3 – Very Good, 4-Excellent) OR a rubric will be provided.**

**14 Weeks of homework material. You can get up to 10 points for each homework assignment.**

**Total Points: 290. Minimum points for each letter grade is therefor (A- 260 points, B – 230 points, C – 200 points, D -170 points)**

## **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.

## Important Caveats:

Please make a habit of regularly backing up your computer work -- e.g. make multiple copies. Missing computer files or crashed hard drives are not legitimate excuses for lost work or missed deadlines. **Backup, Backup, Backup!**

Also, consider bringing a flash memory to every lab session for backing up course work or creating a google or dropbox account.

**Caution:** Keep in mind as you progress toward student teaching that as a student teacher your students will have an interest in finding out about you. This will lead them to Internet searches. Don't put anything on a web page, YouTube, Facebook, MySpace, etc., that you wouldn't want students, parents, teachers or administrators to see.

**It is important to be a reflective teacher and student. We will discuss throughout the semester the technologies we are using and the benefits and draw backs of these technologies. As you work through the project these are some things to keep in mind:**

1. What physics did this project cover?
2. What technology?
3. What pedagogy?
2. What other physics could this technology cover?
3. What other technology could we have used to teach this project's physics (#1) with?
4. What other pedagogy could we have used?

I hope that by the end of the semester you will have answered the follow:

1. What do you see as the role & impact of technology in the modern science classroom?
- 2. How can a teacher best incorporate technology so as to maximize student learning?**
3. How should technology be used so as to get students to work together in groups productively?
4. What technological factors do you believe influence the motivation and engagement of students in the modern science classroom?
5. How would you adjust the practice of a lab activity encountered in this course to better meet the needs of each student in the content area?
6. What benefits arise from the use of instructional technology in the modern science classroom?
- 7. How can technology be used to provide for differentiated instruction that takes into account diversity among learners?**
8. What justification can you made for the use of scientific technology in the classroom (probes, Graphical Analysis, etc.) and the values these have for student learning?
9. What role might the use of scientific technology in the classroom play in the recruitment of the next generation of scientists and/or teachers?
- 10. What role does the use of scientific technology in the classroom play in achieving scientific literacy among all students?**

## 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.