Classification of Instructional Programs (CIP) code: 15.0304

<https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=88144>

Syllabus  
PHOE 144: TOOLS AND TESTING  
xxx College

### Instructor: xxx

# Email: [xxxx](mailto:doctor.nosiglia@gmail.com)

Corequisites: none

Course Description:

This 14-week course, which includes lab, online, and in-class components, provides a hands-on introduction to tools and methods used for measurement, testing, and quality control, and for repair, with emphasis on those used in photonic systems. This class blends online and in-class learning, with a heavy emphasis on lab skill development.

PHY 144 is a foundation course of the Advanced Manufacturing and Integrated Photonics Technician Certificate Program - AMIP. You will use online course modules which provide video lectures and brief quizzes that test whether you are ready for lab work. In class, we will have more detailed discussions, demonstrations of techniques and equipment, and plenty of lab bench time. The class will begin with safety training, leading to federal OSHA-10 certification.

This course covers the concepts common to measurement methods in general and the tools used to carry out those measurements. Many of the electronics and electrical measurement skills developed in PHY 142 (which should be taken simultaneously with this course) will be put to use, along with related mechanical, thermal, and optical methods.

Student Learning Outcomes: As a result of successful completion of this course you will be able to

* Conduct work in a safe manner
* Use, test, and repair lab equipment
* Make analog and digital electronic measurements
* Make optical measurements

These course-level learning outcomes will help you achieve the overall program level learning outcomes listed below.

* Safety
* Quantifying the properties of complex systems
* Equipment testing and repair

Safety: Safety is an essential component of this and all classes. Federal OSHA-10 safety standards will be covered at beginning of the class and we will continue to follow those standards. Students violating safe practices will be asked to leave the class for the remainder of the class period. Removal from class more than one time for non-safe working practices will fail the class.

Evaluation: You will demonstrate your learning through online quizzes, brief in class tests, and through lab work. Your course grade will be determined by

Safety quizzes 15%  
Online quizzes 5%  
In-class exams (2 at 10% each) 20%  
Lab work 60%

Course Attendance: Class attendance is an important part of a student’s learning experience, since this class is project based. Frequent absences make it hard to keep up with course material, especially in such a fast-paced program. Since later courses build on the material in earlier ones, excessive absences in one course can cause difficulty throughout the entire program. In addition, regular attendance develops appropriate workplace habits that will be vital in your future employment.   Missing lab work is especially to be avoided since it may affect your lab partners and it may be difficult to arrange time for make-ups of the missed work.

Because of this, the instructor, may limit the amount of missed lab work to be excused, or may place a limit on the number of absences that are allowed. On occasion an absence may be unavoidable due to emergencies, but excessive absences may lead to your failure of the course and possibly removal from the program.

In your professional career, you will need to arrive at work on time every day and to keep your employer informed of unavoidable absences. Similarly, maintaining communication with your instructors is vital to success in this program. If an absence or tardiness is unavoidable, let the instructor know you will not be present, and immediately make arrangements to make up any work that was missed.

Failure or withdrawal from a course: If for any reason a student fails or withdraws from a course but wishes to continue in the program, the student will need to retake the course the following year, at their own expense. Any other courses for which the missed course is a prerequisite cannot be taken until that course has been successfully completed. Only in extreme and unusual cases would a waiver of the prerequisites be issued.

Remediation: If Attendance (below 80% of course dates and duration of each course time), Performance (grades trending below a C- range) and Participation (appropriate for course) levels become a concern and without notifications and discussions (communication) with Instructors, the Program Advisor and Program Coordinator will be notified and a meeting will be requested between student, Advisor, Coordinator and Instructor to discuss remediation and program options (that may also include dismissal from the program).

Topics covered:

* Safety certification
* Good measurement practice
* Measurement uncertainty
* Error propagation
* Mechanical measurements
  + Calipers and micrometers
  + Mass, force, and pressure measurements
* Thermal measurements
  + Thermometers and thermocouples
* Electrical measurements
  + Ammeters and voltmeters
  + Digital multimeters (DMM’s)
  + Oscilloscopes, power spectra, and waveform measurements
* Optical measurements
  + Intensity and power measurements
  + Frequency measurements
  + Laser-based distance measurements
  + Microscopes
* Operation and management of manufacturing equipment
* Specific tools
  + Soldering iron
  + Breadboard

Helpful links:

* Blackboard: <https://blackboard.coursesites.com/ultra/courses/_561045_1/cl/outline>
* OSHA: <https://www.youtube.com/watch?v=hMVGtnBwH7s>
* Using Arduinos in Electronics class: [http://falconphysics.blogspot.com/2009/01/arduino-in-high-school-electronics.html](https://owa.bpsma.org/owa/redir.aspx?C=DyyAlT_mrk6-F634nIE8Q6j1S30FQdMIbBG82DRqBjijcVY2d47_75-OqxKvIcpWial5A2T8L_c.&URL=http%3a%2f%2ffalconphysics.blogspot.com%2f2009%2f01%2farduino-in-high-school-electronics.html)
* Circuit simulator: [http://www.falstad.com/circuit/](https://owa.bpsma.org/owa/redir.aspx?C=zdIgg_JPukuho_W7_VCCWuRxj1cXMtMIVXmfLVn1-1_vUKP1zp8XJC2XfsuHwBN444xP9hQ7hAg.&URL=http%3a%2f%2fwww.falstad.com%2fcircuit%2f)
* How capacitors work, video: <https://www.youtube.com/watch?v=IvFVu7Jxa2I>
* how to use a micrometer - <https://www.google.com/search?q=how+to+use+a+micrometer&rlz=1C1GIGM_enUS674US674&oq=how+to+use+a+micrometer&aqs=chrome..69i57j0l7.8383j0j8&sourceid=chrome&ie=UTF-8#kpvalbx=_tulvXtC6NsWlytMP_LaFqAk78>How does electricity work, video: <https://www.youtube.com/watch?v=ZInLPe_bezQ>
* Misconceptions in electronics: <http://amasci.com/miscon/elect.html>
* how to use a caliper - <https://www.google.com/search?rlz=1C1GIGM_enUS674US674&ei=tulvXtC6NsWlytMP_LaFqAk&q=how+to+use+a+caliper&oq=how+to+use+a+caliper&gs_l=psy-ab.1.0.0l10.324958.326516..328268...0.3..0.111.548.6j1......0....1..gws-wiz.......0i71j0i67j0i10.9KuEfr-UHOw#kpvalbx=_AOtvXu65BqKOggeUkaWgBA35>
  + - oscillation waves:

<https://www.youtube.com/watch?v=VKtEzKcg6_s>

<https://www.youtube.com/watch?v=nFzu6CNtqec>

<https://en.wikipedia.org/wiki/Waveform#/media/File:Waveforms.svg>

Honor code: all students are expected to conduct themselves as members of the xxx College community. A copy of the institution’s honor code may be found at: **Insert link to College’s honor code here.**

Students with disabilities: xxx College is committed to providing all students equal access to learning opportunities. Students registered with the **Insert name of disability services office here** are encouraged to contact their professors as soon as possible, preferably prior to the start of the semester, to inform them of the accommodations for which they qualify. Students are responsible for providing their professors with an accommodations verification letter and discussing their needs with them. Students who have, or think they may have, a disability are invited to contact the College’s office of disability servaces at **Insert contact information for office here**

Recording of classes and presentations: Recording, either by the instructor or by students, of any classes, presentations, or anything else that includes other people will only be allowed if everyone appearing in the recording has given clear consent. When in doubt, seek more detailed guidance from the instructor.

Other policies: No information about grades may be posted publicly. For current updates on your grades, speak to the instructor directly or check Blackboard. No grade information can be sent by e-mail unless the student has given explicit written approval.

Cellphones should be switched off in class. Texting and other potentially distracting activities should also be kept to a minimum. Cellphones should be out of sight during any quizzes and tests.

Keep in mind that any material from other people that is quoted in reports or presentations should be clearly attributed to their original source in order to avoid plagiarism and copyright violations. Guidance on the use of quotes, excerpts, and outside data can be found at **Insert link to College library’s copyright information resources here**