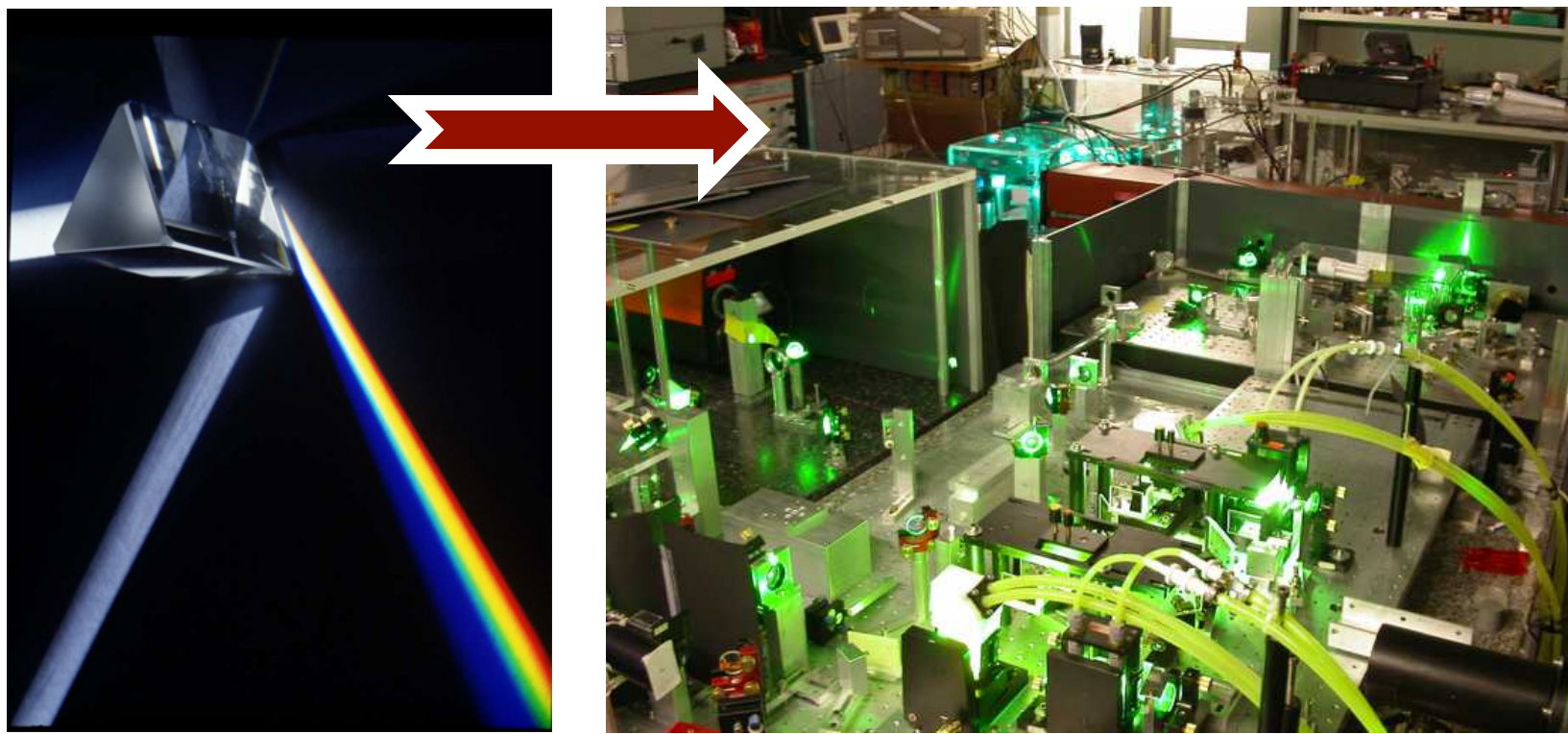


Course Information and Background



Prof. Jason Heikenfeld

824 Rhodes Hall / 556-4763 / heikenjc@ucmail.uc.edu / www.ece.uc.edu/devices

▶ **Office hours:** M-F 8:15-9 AM, *anytime if I am free, or schedule an appt. if it is important.* Email is great, and the best way to reach me 7 days/week! Video Skype name is 'Heikenfeld'

▶ **Grading** (see lab schedule for points for each lab/test). **Lab reports are due before the start of quiz/lecture**, after that 10% per day. None after final.

▶ **Make Up Policy** - No makeup tests/assignments without proof of tragedy, illness, or photos of supernatural events.

▶ **\$50 fee** must be given to Janie Runck in 812 Rhodes (each kit uses \$15k to \$30k in parts, we need to maintain the lab). Also, if you break something expensive out of carelessness, we will need to talk... *If you write a check, make it payable to Univ. Cincinnati.*

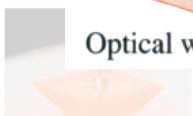
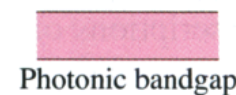
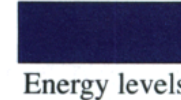
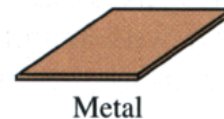
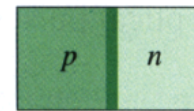
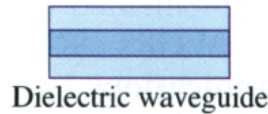
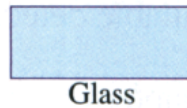
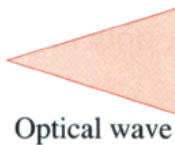
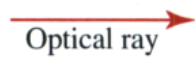
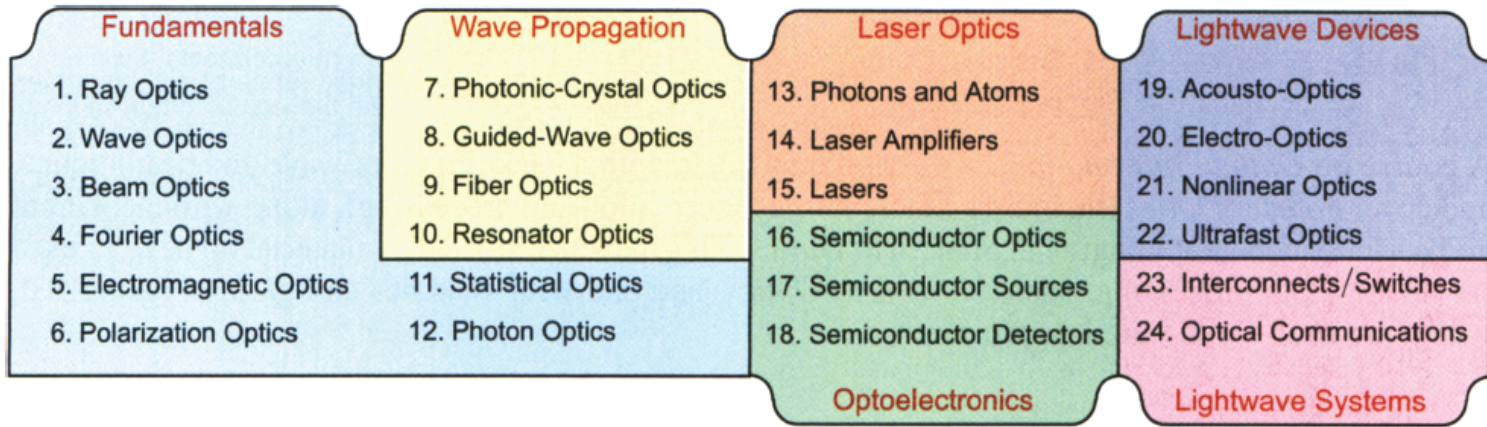
▶ This is a 6XXX level course, half lecture, half lab. I will be available to answer questions regarding the lecture, but **you are expected to work independently in the lab!** The lab procedures are well documented and proven... FOLLOW THEM CLOSELY/EXACTLY – IF NOT, WILL COST YOU TIME!

▶ **Workload:** It will vary! Some labs will be fast, some long. Some weeks easy, some hard. However, ON AVERAGE the course load is reasonable for a 3 credit hour course. Furthermore, the last few weeks are for a design project and there is no final exam!



► **Reference Textbook:** Fundamentals of Photonics, 2nd Edition, B. Saleh

I surveyed more than 12 books in preparing for this course, this is the best book I found in preparing students to exploit electromagnetic waves for an extremely diverse range of engineering applications. An excellent 2nd reference book is 'Hecht – Optics'.



- ▶ Each person turns in their own printed lab report. Graded reports will be returned in the lab.
- ▶ Use the lab report template provided on Blackboard “SECS6XXX_Report_Template.doc”. **FOLLOW THE TEMPLATE!** If the TA has to ‘hunt’ for information/items, then no credit for those items!

(5) group/date/title
(-_) deductions for improper equipment use, storage, or cleanup

1. Measurement of Refractive Index Through Refraction

(10) diagram 1-3 ♦ diagram 1-4
(5) equation:
(25) table or list of results for H_1, H_2 ♦ V_1, V_2 ♦ θ_i, θ_r ♦ D_{water} ♦ $D_{\text{water/CaCl}}$
(15) accuracy of results for $n =$
(20) quality of text supporting the items below (introduction, procedure, results, discussion)

2. Measure of Refractive Index Through Total Internal Reflection

(5) diagram 1-5
(5) equation:
(10) table or list of results for X, Y, θ_0 ♦ $n =$

(5) accuracy of results for $n =$
(15) equation setups: ♦ ♦
(20) quality of text supporting the items below (introduction, procedure, results, discussion)

3. Measurement of Refractive Index Using Fresnel Reflection

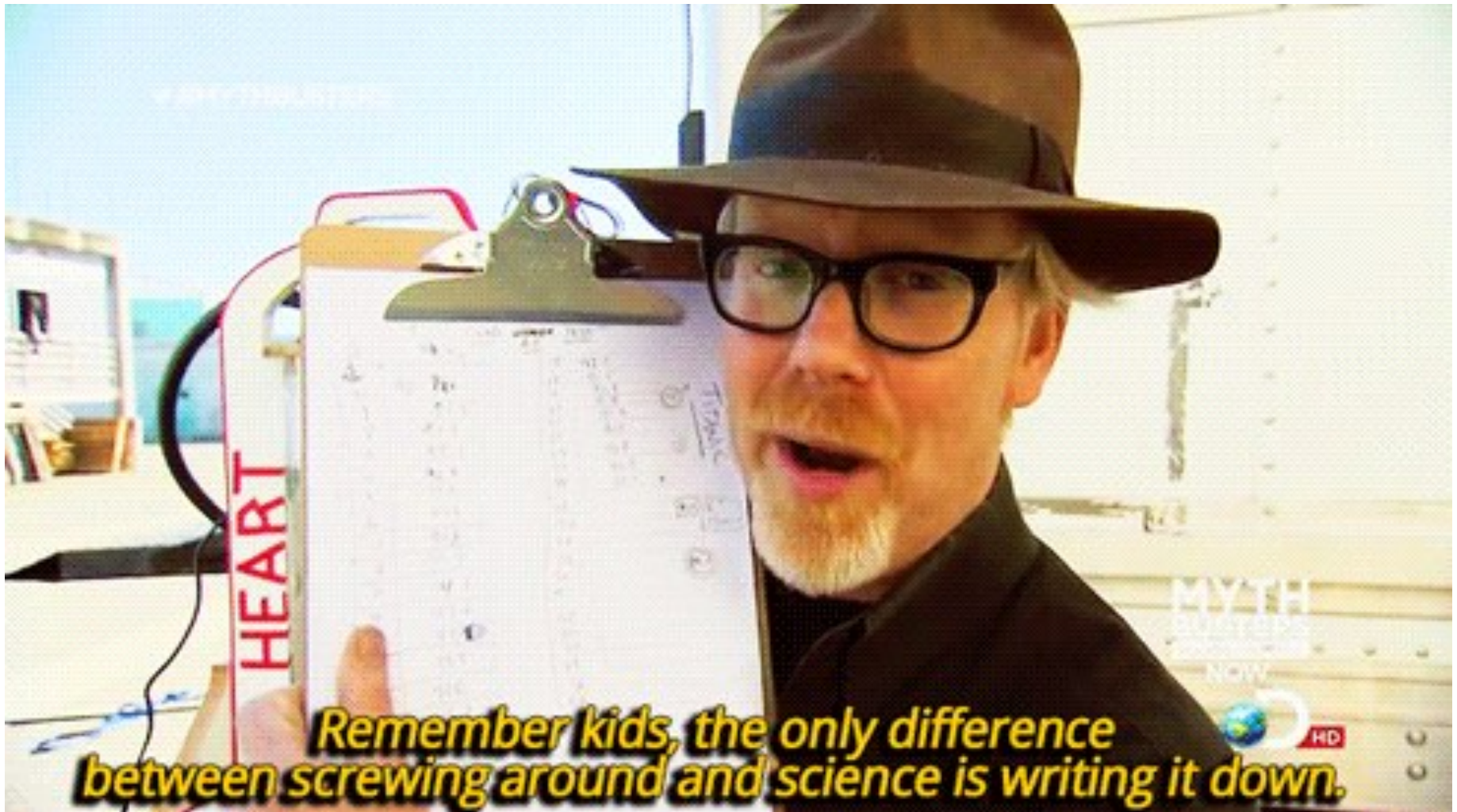
(5) diagram of laser hitting slide and Fresnel reflection off slide
(5) equation:
(5) results for $n =$
(5) accuracy of results for $n =$
(20) quality of text supporting the items below (introduction, procedure, results, discussion)
(5) answer to question:

4. Extra Homework Problem (30 points)

▶ Suggestion: build up basic optics parts drawings in power point or another drawing tool and re-use them in future lab reports. You may not simply copy images or drawings I give you. In some cases, a simple camera phone photo that you properly label and annotate in powerpoint is fine also.

▶ Each person creates his or her OWN lab report, will be graded individually, but you may work openly/cooperatively with your classmates (it is encouraged, helps you learn more and faster!).

▶ In general, a good lab report will have sufficient information such that an engineer can readily understand your experiment, the key results. In a good lab report you could re-examine your report 5 years later and have everything you need to use the findings... new product development takes years, research takes years, patents require thorough documentation!



► **Lab Groups:** 2-3 persons per group! If someone is underperforming or disruptive in your group, let me know privately! Each week I will use this tool to randomly generate groups and post the results on blackboard: <http://www.brendenisteaching.com/tools/sortinghat/>

► **Lab Times:** You may use the lab anytime of the week that you choose, but all your lab partners must be present, no exceptions! See Rob Montjoy if you still do not have card access. We have 5 tables and kits for most weeks, and for some weeks (like fiber optics) only 3 kits. Each week you should organize w/ your lab partners and use this calendar to reserve the time you need: <http://teamup.com/ks1e3aa14db5e11983/>

► **In-Lab Policies:** NO FOOD OR DRINK! DO NOT TOUCH OPTICAL SURFACES (LENS, MIRRORS ETC).

Place ALL personal items below the tables or by the door. The optical equipment is expensive and having a clear workspace should prevent accidents or damage. The only exceptions are things to write on or work on (notebooks, laptops, etc.). Nothing else may be on ANY of the table surfaces.

► **Each week, we will post everything you need on blackboard, and we will:**

- 1) Answer any questions you may have regarding the lecture.
- 2) Answer any questions you may have regarding the lab.
- 3) Take a 10-20 min quiz based on past weeks lab, and current weeks lecture (simple if you did the lab, and viewed the lecture)!
- 4) Copies of the quiz answer key provided on way out the classroom, or reviewed after the quiz for those willing to stick around until end of quiz time... it will not be posted.

This quiz is graded automatically online on blackboard, so be logged in online to blackboard as we start the quiz!
We do have a quiz the 1st day, and it 1 covers the lecture AND this course introduction presentation!



Your work space should be pristine and completely organized after you are done with lab.

IMPORTANT: Document missing/broken parts before you start lab. Anything you damage or break during lab, document also. I will regularly check the kits. Any missing parts, parts not put back in their proper place, poor cleanup, or poor equipment handling will result in loss of points for all members of a lab group. Not sure about a part? Ask!

DO NOT BORROW OR MIX PARTS FROM OTHER KITS. It causes chaos...

The form shown at right is on blackboard and EVERY group must turn at least one in with one of the lab reports for that group (else everyone in your group loses 20% for that lab).

IF YOU BREAK SOMETHING AND DONT WRITE IT DOWN OR TELL ME, AND I TRACE IT BACK TO YOUR GROUP, THEN YOU GET A ZERO FOR THAT LAB. TELL ME PLEASE!



You may not move parts from kit to kit. If anything is broken/missing, let the professor know immediately and he will get you a replacement part. This form is due with your lab report each week, else you will lose 10% off your grade.

- 1) Complete week/names/times info listed below.
2) List the table and kit #'s you used. This is MANDATORY!
3) Lastly, only list damaged, broken, or missing parts! Use the convention below.

Label as 'G' good, 'M' parts missing or broken, 'D' damaged, 'W' we broke or damaged it. For example: "Mirror - 4G" or "Fiber Kit - 2M".

By writing our names below, we hereby verify to the best of our knowledge that the equipment documentation provided below is true.

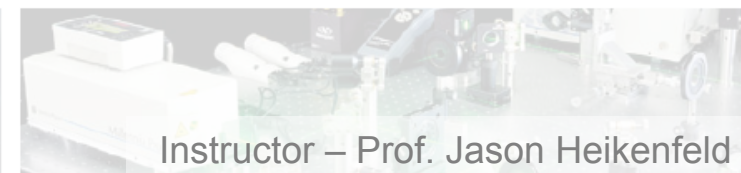
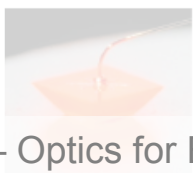
Week: _____

Last Names: _____, _____, _____

Day, Time-Time: __, __ - __ / __, __ - __ / __, __ - __ / __, __ - __

Table with 4 columns for tracking equipment: Clean Table - #, Optics Kit - #, Fiber Kit - #, and a blank column for additional items.

Additional notes (space cleanliness, consumables needed, etc.):



Week	Topic	Pts.	Notes
1	Basic Light Interactions (Refraction, Absorption, etc.)	30	<i>1st week takes longer...</i>
2	Lenses, Magnification, & Beam Expanders	40	<i>2nd week you get faster, better...</i>
3	Optical Interference	50	<i>3rd week you are skilled (little wasted time)...</i>
4	Diffraction	50	
5	Polarization	50	
6	Fourier Optics	50	
7&8	Fiber Optics	80	<i>You will get two weeks to complete this lab!</i>
9	Displays	50	
10	Emitters/Detectors	50	
11	Bio-photonics – Lecture / Lab: Part 1	-	<i>Work on part 1 this week, present next week.</i>
12	Bio-photonics – Part 1 Presentations / Lab: Part 2	40	<i>Work on part 2 this week, present next week.</i>
13	Bio-photonics – Part 2 Presentations / Start Final Proj.	60	<i>Get approval from Dr. H! Order any parts!</i>
14	Final Project: informal presentations on design & procedures		<i>Provide an update to Dr. H on your progress!</i>
15	Final Project: Demonstrations During The Week	100	<i><u>Schedule</u> a demo and presentation with Dr. H.</i>
16	Quizzes Total	350	<i>Averaged out at the end to be out of 300 pts. total.</i>

► I reserve the right to remove % points from a weeks lab if I observe poor compliance with lab policies, or if I am asked to help you and you clearly did not follow the provided instructions.

► You **MUST** score >60% average on all the quizzes to pass the course. NO EXCEPTIONS.

