Optical Engineering
Senior Design
OPT310
&
Optics
Senior Thesis
OPT320

2017-2018
Fall Update

Professor
Wayne H. Knox
Growth in Optics
Senior Design Class

#Students

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<tr>
<td>Teams</td>
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Growth in Optics
Senior Thesis Class too

#Students

![Bar Chart: OPT321 Senior Thesis](chart.png)
Fall semester Senior Design

• Fundamentals: How to Interview a potential Customer
  • In-class exercise WHK President of Zapp Photonics Intl. (ZAPPI)
• Interview customers
• Decide team project choices, submit essay
• WHK assign teams
• Assemble teams
• Start bi-weekly interviews with customers
• Determine Product Specifications, customer needs and wants
• Draft a Product Requirements Document
  • 1st, 2nd and 3rd revisions
  • Review in class every two weeks
• Final Product Requirements Document submitted by Teams
  • PRD includes draft timeline, project budget, equipment lists etc.
Team Proposals

• Formal Cover Letter
  • “Applying for the job”

• One-page CV
  • In my specific format

• Two-page essay
  • Three paragraphs
  • Detail first, second and third team project choices
  • Detail qualifications, motivation
  • Any suggested teaming
Important lessons (senior class)  
LAST CHANCE !!

• Favorite class questions include:

• “Prof. Knox, does the One Page Essay have to be one page ?”
  • YES of course !!!

• Assignment is due at 6:00pm ; “Prof. Knox, does 7:30pm submission constitute a late submission ?”
  • YES  0/15 points
Design Teams with Interdisciplinary Needs

- Optical Engineering Seniors
- Mechanical Engineering Grad Student/Post Doc
- CS Junior Advisor

Augment teams with Engineering Advisors
Interdisciplinary Parallel Teams

+ Faculty Advisors, Junior Engineering Advisors, Grad Students and Post-Docs
Eleven Teams for 2017-2018:

• Vikram Dogra, M.D. and Dr. Navalgund Rao (URMC)
  • Aspheric Acoustic Fresnel Lenses for Photoacoustic Imaging of Thyroid Cancer

• Dr. Robert Hill, MD (Harmonigenic)
  • Second harmonic imaging system for metastatic breast cancer screening

• Dr. Tao Chen (ASML)
  • Optical source coherence length measurements system for lithography mask aligner

• Dr. Jennifer Kruschwitz (UR Optics)
  • System for accurate measurement of silicon dioxide film thickness using a two beam technique
Teams, (cont)

- Todd Blalock (Optimax)
  - Tolerancing and testing of a freeform monolithic telescope

- Russ Hudyma (Navitar)
  - Plenoptic imaging camera system image simulator and system design

- Calvin Uzelmeier (Rochester Museum and Science Center)
  - Design, fabrication and testing of a new Optics exhibit showcasing a Rochester Optics Company or a technology developed by a woman scientist

- Arnulfo Torres, RN
  - Novel optical system approach to quantitatively measuring the patient response in Tuberculosis testing
Teams (cont.)

• Dr. Ahmed Ghazi and Dr. Greg Schmidt (URMC/Optics)  Optics Mech E Double Team / possibly BME triple team
  • Near infrared light surgical trainer, design fabricate and test

• Dr. Brandon Zimmerman (NASA/DigitEyez)
  • Image simulator for vision testing to minimize autorefractor errors

• Dr. James Francis (Raptor startup)
  • Wide angle lens designs for high speed 360 degree Virtual Reality/Augmented Reality cameras
Senior Thesis Students OPT320

- Discuss research interests with WHK, develop list of five professors to interview
- Interview with five professors, take lots of notes
- Negotiate a position in a research group
- Write up one page CV, Research search summary, and formal cover letter applying for the position
- Fall semester – write a NSF-style thesis proposal
Senior Design/Senior Thesis
Intellectual Property track

• Reid Cunningham UR Ventures
  • Introduction to Patents, Copyrights and Trademarks
  • Patents and the Patenting Process
  • Finding Inventions in Your Work

• Patent Analysis Assignment
  • Read and understand a US Patent assigned
  • Eight recent patents in WHK chosen area
  • Patent Analysis
  • Summary statement – what the patent is all about
  • Submit assignment
  • Groups present patents/discuss in class

• WHK “IP Wars”
  • WHK experience in University, Government Labs, Bell Labs
  • WHK Experience as Expert Witness (5 cases+)
  • WHK Experience as Founder of Clerio Vision, Inc.
  • WHK >50 US Patents (>153 International Patents wipo.int)
  • Pre-employment agreements, IP agreements, UR IP Agreement, etc.
ABET Topics (also for thesis students)

• Professional Ethics in Optical Engineering and Science
  • Lecture
  • In-class exercise – role playing
  • In—class 5-minute essay

• Commitment to Lifelong Learning
  • Lecture
  • In-class exercises/discussion
  • In-class 5-minute essay

• Commitment to Sustainable Optical Engineering
  • Lecture
  • In-class exercise – role playing
  • In-class 5-minute essay
Spring semester Senior Design

• Execute the plan
• Report to the class every two weeks
• Meet with customers every two weeks
• Drafting Design Description Document
  • 1\textsuperscript{st}, 2\textsuperscript{nd}, 3\textsuperscript{rd} revisions
• Rehearse “Elevator Pitch” 90 seconds
  • Shotgun session at Spring IA Meeting
• Final customer presentation
• Submit final DDD
• Present posters at Hajim School Design Day
• Deliver prototypes/reports (deliverables) to customers
• WHK Customer survey
Spring Semester Senior Thesis

- Do your research as specified in your thesis proposal
- Midterm review
- Final presentation and thesis writeup
OPT310/320 are Writing/Speaking Courses!

- Drafting, revising finalizing Product Requirement and Design Description Documents
- In class formal Design Reviews
- Practice 90 second Elevator Pitches (Spring IA mtg)
Hajim School Design Day

• All Hajim School Departments present the results of their Senior Design (and Senior Thesis) work
Is your Company Interested in being a Senior Design Customer?

• Let me know by August, 2018
• How about this? Hire an Optics Junior intern for summer 2017, and then we can assign the student to your design team for the academic year 😊
• Let’s talk!
SENIOR DESIGN I: Fall 2017

Nancy Aguilar
Katharine Armstrong
Madilyn Bookman
Michael Bruncman
Stephen Chess
Pellegrino Conte
Yang Deng
Lei Ding
Senior Thesis Students

Jonathan Dietz
Brandon Dube
Jonathan Heinz
Markus Rothacker
Oscar Ta
Kaia Williams
Jeremy Staffa