



*Syllabus for*

**Frontiers in Optics – OSE 4930.0001 – Fall 2014 – 2 credit hrs.**

<b>Instructor:</b> Dr. Stephen M. Kuebler	<b>Term:</b> Fall 2014
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<b>Phone:</b> 407-823-3720	<b>Class time:</b> 10:30 am - 12:20 pm
<b>Office:</b> Phys Sci 347	<b>Class location:</b> CREOL 102
<b>Office hours:</b> Mon & Wed 9:00 am - 11:30 am	<b>Website:</b> On WebCourses

I will be in my office at these times, but of course I will be happy to discuss the material with you anytime. Often, I get questions via e-mail that can be quickly answered.

**Course Catalog Description**

Introduction to recent advances in optics & photonics, to ethical issues, and to effective communication appropriate to the field of optics & photonics.

**Prerequisites**

Senior standing and either Introduction to Photonics (OSE 3052), Optics (PHY 4424), or Optical Engineering (EEL 4440).

**Topics**      *(A detailed schedule with dates follows at the end of this document.)*

- Historical perspective of the field of Optics and Photonics
- Guide to publishing research
  - Refereed vs. non-refereed journals, books, proceedings, conference papers.
  - Peer review process.
  - Ethical issues.
- Guide to the major journals in Optics and Photonics and journal quality measures.
- What makes work publishable? Ethical issues. Data management and reporting.
- Guide to effective communication in the field of optics and photonics:
  - Communicating appropriately and effectively with different audiences.
  - Written communications: reports, publications, patents, proposals.
  - Writing abstracts.
  - Oral communication techniques: conference talks, posters, seminars, “elevator speeches”, talking without visual aids. Rubrics as guides to communication effectiveness.
- Students’ projects: select topics, prepare literature reviews, present oral presentations on topics, write abstracts of presentations.
- Intellectual property

## Learning Outcomes and Measures

(As found in the Bachelor of Science in Photonic Science and Engineering program.)

	<b>Graduates will have the ability to apply knowledge of mathematics, science, and engineering.</b>		
Outcome: 6	<b>Graduates will have an understanding of professional and ethical responsibility</b>		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	6.1	<b>OSE 4930 Frontiers of Optics and Photonics:</b> A passing student must demonstrate knowledge of the ethical issues regarding publications and the peer review process, work credit sharing allocations, data management and reporting, citations and plagiarism.	80% of students will receive satisfactory performance on the relevant parts of the students' participation and presentations in the course.
Outcome: 7	<b>Graduates will have the ability to communicate effectively.</b>		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	7.1	<b>OSE 4930 Frontiers of Optics and Photonics:</b> A passing student must demonstrate effective written communication with different audiences and different written communication modes: reports, publication, patents, and proposals.	80% of students will receive satisfactory performance in their participation and presentations in the course.
	7.2	<b>OSE 4930 Frontiers of Optics and Photonics:</b> A passing student must demonstrate effective oral communication techniques for different audiences, conference presentations, posters, seminars, "elevator speeches", and presentations without visual aids.	80% of students will receive satisfactory performance on the relevant parts of the students' participation and presentations in the course.
Outcome: 8	<b>Graduates will have the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal contexts.</b>		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	8.1	<b>OSE 4930 Frontiers of Optics and Photonics:</b> A passing student must demonstrate knowledge of the historical perspective of optics and photonics and the societal impact of recent advances in the field.	80% of students will receive satisfactory performance on the relevant parts of the students' participation and presentations in the course.
Outcome: 9	<b>Graduates will have recognition of the need for, and the ability to engage in life-long learning.</b>		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	9.1	<b>OSE 4930 Frontiers in Optics and Photonics:</b> A passing student must demonstrate the ability to self-learn content beyond that taught in classroom instruction.	70% of students will receive a score of 75% in the relevant questions in a class activity. .
Outcome: 10	<b>Graduates will have knowledge of contemporary issues.</b>		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	10.1	<b>OSE 4930 Frontiers of Optics and Photonics:</b> A passing student must demonstrate knowledge of the history and future prospects of the field of Optics and Photonics.	80% of students will receive satisfactory performance in their participation and presentations in the course.
	10.2	<b>OSE 4930 Frontiers of Optics and Photonics:</b> A passing student must demonstrate knowledge of product life cycles, research and development, published research and intellectual property.	80% of students will receive satisfactory performance in their participation and presentations in the course.

## Relationship of Course to ABET Criteria

<i>ABET Criteria</i>	<i>Emphasis</i>
(a) An ability to apply knowledge of mathematics, science, and engineering.	High
(b) An ability to design and conduct experiments, as well as to analyze and interpret data.	Medium
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as <u>economic</u> , <u>environmental</u> , <u>social</u> , <u>political</u> , <u>ethical</u> , <u>health</u> and <u>safety</u> , manufacturability, and sustainability.	High
(d) An ability to function on multidisciplinary teams.	High
(e) An ability to identify, formulate, and solve engineering problems.	High
(f) An understanding of professional and ethical responsibility.	High
(g) An ability to communicate effectively.	High
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	High
(i) A recognition of the need for, and an ability to engage in life-long learning.	High
(j) A knowledge of contemporary issues.	High
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	Medium

### Detailed Course Description

This course introduces the students to recent advances in optics & photonics. Students will read selected articles in technical magazines, e.g., Optics and Photonics News, SPIE Professional magazine, Physics Today, IEEE Spectrum, IEEE Circuits & Devices, and make seminar-like presentations to the class. Ethical issues associated with research and data management will be discussed and will be addressed in students' presentations. Students will also be introduced to effective communication techniques, as appropriate to the discipline.

Students will also hear presentations from experts in our field, to accompany selected readings and assignments, on the topics listed below.

- Communication techniques
- Library research methods
- The optics and photonics industry
- Professional preparation for a career in industry
- Entrepreneurship
- Professional ethics and responsibility
- Philosophical origins of science and the scientific method

At the conclusion of the semester, each student will have created a dossier of writings and presentation materials that showcases their understanding of modern optics and photonics; communication skills; interdisciplinarity; professional ethics and responsibility; and how their technical field is connected with issues like manufacturability, sustainability, health and safety, and other economic, environmental, social, or political constraints.

## **WebCourses and Web Resources**

This syllabus, other course materials, and some assignments are found on WebCourses. All students are already enrolled in WebCourses. WebCourses is accessible from <https://my.ucf.edu/>. Many of the assignments require you to read materials that are available for download from WebCourses or elsewhere on the web. To be successful in this course, it is essential that you read these materials carefully and complete the corresponding assignments prior to each class period, per the assignment schedule below.

## **E-Mail Communication**

The instructor will communicate with students frequently using e-mail. UCF requires faculty to communicate with students exclusively via their knights.ucf.edu accounts. Make sure that you check your knights account frequently. If you do not, you may miss important announcements regarding grades, exam content, etc.

## **University Writing Center**

The University Writing Center (UWC) offers writing support to UCF students from first-year to graduate in every discipline. Trained peer consultants provide help at every stage of the writing process, including understanding assignments, researching, drafting, revising, incorporating sources, and learning to proofread and edit. The UWC's purpose is not merely to fix papers or to make better writers, but to teach writers strategies to navigate complex situations for writing, both in and outside the University. Consultations are available for individuals and small groups. To make the best use of the UWC, visit far enough before your due date to allow yourself time to revise after your consultation, browse the writing resources on their website, and arrange a regular weekly appointment if you require long-term help. You may schedule a 45-minute appointment by phone or by using the TutorTrac scheduler on the UWC website. Walk-in consultations are also available. You can contact UWC staff at: Colbourn Hall, Room 105; Satellite Locations: Main Library, Rosen Library & Online; Tele: 407-823-2197; <http://uwc.ucf.edu>.

## **Students with Special Testing/Learning Needs**

It is my goal that this class be an accessible and welcoming experience for all students, including those with disabilities that may impact a student's learning or performance on assignments and tests. UCF is fortunate to have an outstanding Student Disability Services (SDS) Center ([www.sds.sdes.ucf.edu](http://www.sds.sdes.ucf.edu)), with professionally trained staff who help students and faculty ensure that courses are accessible and to develop accommodation plans that help students achieve their academic goals. SDS staff can be contacted at Ferrell Commons Room 185; Tele: 407-823-2371; E-mail: [sds@ucf.edu](mailto:sds@ucf.edu).

Students who know they have special needs or who require special accommodations must be registered with SDS prior to receiving those accommodations. Students must have documented disabilities requiring the special accommodations and must meet with the instructor to discuss the special needs as early as possible in the first week of classes.

If anyone believes the design of this course poses barriers to participating effectively and/or demonstrating learning in this course, please meet with me (with or without an SDS accommodation letter) to discuss reasonable options or adjustments. During our discussion, I may suggest the possibility/necessity of your consulting SDS staff to talk about academic accommodations. You are welcome to talk to me at any point in the semester about course

design concerns, but it is always best if we can talk at least one week prior to the need for any modifications.

### **Classroom Conduct and Courtesy**

All students are expected to conduct themselves in a manner consistent with the student code of conduct, as set forth in the Golden Rule (<http://www.goldenrule.sdes.ucf.edu>), so that everyone in the class has an opportunity to learn, free from interruptions and distractions. This means that:

- Cell phones are off and not used at all during class.
- Students do not converse during class.
- Students are attentive to lecture and do not text or engage in distracting computers use, including email, surfing the web, playing video games, etc.
- Students come to class on time. If you arrive late, please enter quietly and sit toward the back.

Please do all you can to help maintain a positive and productive classroom environment.

### **Ethical Behavior and Academic Misconduct**

UCF faculty members have a responsibility for your education and the value of a UCF degree, and so seek to prevent unethical behavior and when necessary respond to infringements of academic integrity. Academic dishonesty in any form will not be tolerated! If you are uncertain as to what constitutes academic dishonesty, please consult The Golden Rule in the UCF Student Handbook ([www.goldenrule.sdes.ucf.edu](http://www.goldenrule.sdes.ucf.edu)) for further details. As in all University courses, The Golden Rule Rules of Conduct will be applied.

Penalties for violating these can include a failing grade in an assignment or in the course, suspension or expulsion from the university, and/or a "Z Designation" on a student's official transcript indicating academic dishonesty, where the final grade for this course will be preceded by the letter "Z". For more information about the Z Designation, see <http://z.ucf.edu/>. For more information about UCF's Rules of Conduct, see <http://www.osc.sdes.ucf.edu/>.

### **Diversity and Inclusion**

In order to learn, we must be open to the views of people different from ourselves. Each and every voice in the classroom is important and brings with it a wealth of experiences, values and beliefs. In this time we share together over the semester, please honor the uniqueness of your fellow classmates, and appreciate the opportunity we have to learn from each other. Please respect your fellow students' opinions and refrain from personal attacks or demeaning comments of any kind.

The University of Central Florida recognizes that our individual differences can deepen our understanding of one another and the world around us, rather than divide us. In this class, people of all ethnicities, genders and gender identities, religions, ages, sexual orientations, disabilities, socioeconomic backgrounds, regions, and nationalities are strongly encouraged to share their rich array of perspectives and experiences. If you feel your differences may in some way isolate you from UCF's community or if you have a need of any specific accommodations, please speak with the instructor early in the semester about your concerns and what we can do together to help you become an active and engaged member of our class and community.

## Assessment and Grading

Scores earned for the various assignments will be weighted per Table 1 and summed to obtain an overall course score. The final letter grade for the course will be determined according to Table 2. Scores and grades will not be rounded under any circumstances. Grades for all assignments will be posted on WebCourses. Further information on assignments follows below.

## Grade Objections

All objections to grades should be made in writing within one week of the work in question. Objections made after this period has elapsed will not be considered.

**Table 1.** Weighting of assignments.

	<i>Component</i>	<i>Weighting</i>
1	Quality of in-class participation (incl. outside reading, study, and preparation)	20%
2	Short-form assignments (sig. of optics essay, abstracts, elevator speech, CV, EndNote library, LinkedIn page, each weighted equally)	12%
3	Reviews of three technical papers (each weighted equally)	9%
4	1000-word research paper	15%
5	Focus-topic presentation (PowerPoint, animation, movies, etc.)	15%
6	Oral delivery of multi-media presentation	4%
7	Wiki page on research topic	15%
8	Final Exam	10%
	<b>Total</b>	<b>100%</b>

**Table 2.** Rubric for assigning letter grades.

<i>Course score</i>	<i>Grade</i>	<i>Rubric Description</i>
93 to 100	A	Excellent. Demonstrates strong understanding of all concepts and is able to apply the concepts in all and novel situations. Has full mastery of the content of the course.
90 to < 93	A -	
87 to < 90	B +	Good. Demonstrates strong understanding of most or all of the concepts and is able to apply them to stated and defined situations.
83 to < 87	B	
80 to < 83	B -	
77 to < 80	C +	Average. Demonstrates a basic understanding of the major concepts of the course and is able to apply to basic situations.
73 to < 77	C	
70 to < 73	C -	
67 to < 70	D +	Below average. Demonstrates a basic understanding of only the simple concepts and is able to apply to only a limited number of the most basic situations.
63 to < 67	D	
60 to < 63	D -	
< 60	F	Demonstrates inadequate understanding of the course content.

## **Make-Up Assignment Policy and Religious Observance and**

Make-up assignments/tests (hereafter, simply "assignments") and due-date extensions will be granted when an assignment must be missed due to major religious observance or to attend an Authorized University Event or co-curricular activities (e.g. football or cheerleading competition, see: #4-401.1 at <http://policies.ucf.edu>). Students who must miss an assignment deadline for major religious observance must notify the instructor no less than one week prior to the assignment/test date. If an illness/emergency arises and a student cannot submit assigned work on or before the scheduled due date or cannot take an exam on the scheduled date, the student **must** give notification to the instructor **no less than 24 hours before** the scheduled date and **no more than 48 hours after the** scheduled date. An assignment missed for illness/emergency will be excused if the student provides a note signed by their health provider stating they were unable to take the test on the scheduled day due to malady. The final grade will then be calculated from a proportionally weighted average of the remaining exams and assignments. Assignments missed without an approved University excuse will receive a zero.

## **Financial Aid and Attendance**

As of Fall 2014, all faculty members are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please ensure you complete **Assignment 1** by the end of the first week of classes, or as soon as possible after adding the course, but no later than August 27. Failure to do so will result in a delay in the disbursement of your financial aid.

## **Plagiarism Checking and TurnItIn.com**

In this course we will utilize turnitin.com, an automated system which instructors can use to quickly and easily compare each student's assignment with billions of web sites, as well as an enormous database of student papers that grows with each submission. Accordingly, you will be expected to submit all assignments in both hard copy and electronic format. After the assignment is processed, as an instructor I receive a report from turnitin.com that states if and how another author's work was used in the assignment. For a more detailed look at this process, visit <http://www.turnitin.com>.

## **Textbook and Readings**

1. D. Meredith, *Explaining Research: How to Reach Key Audiences to Advance Your Work* (Oxford Univ. Press: Oxford, 2010), ISBN 978-0-19-973205-0. Available from Amazon.com (~\$33).
2. G. Graff and C. Birkenstein, *They Say / I Say: The Moves That Matter in Academic Writing*, 3rd. edn., by (W. W. Norton: New York, 2014), ISBN 978-0-393-93584-4. Available from Amazon.com (~\$18). The following sections are particularly key:
  - A. Introduction pp. 1-15.
  - B. Part 1.1: "They say: Starting with what others are saying", pp. 19 - 29.
  - C. Part 1.2: "Her point is: The art of summarizing", pp. 30 - 41.
  - D. Part 2.4: "Yes / No / Okay, But: Three ways to respond", pp. 55 - 67.
  - E. Part 2.5: "And Yet: Distinguishing what you say from what they say", pp. 68 - 78.

3. "On Being a Scientist: A Guide to Responsible Conduct in Research." 3rd edn. (National Academies Press: Washington, DC, 2009). Available for download at: [http://www.nap.edu/download.php?record\\_id=12192](http://www.nap.edu/download.php?record_id=12192).
4. C. Mack, "How to Write a Good Scientific Paper", Series of eight articles published in *J. Micro/Nano-Lithog., MEMS, MOEMS* (2013 and 2014). Available as PDFs on WebCourses.
5. G. W. Whitesides, "Whitesides' Group: Writing a Paper", *Adv. Mater.*, **16**(15), 1375 - 1377 (2004).
6. R. S. Capers and E. Lipton, "Hubble Error: Time, Money, and Millionths of an Inch," *Hartford Courant* (31 Mar. - 3 Apr. 1991). Reprinted in abbreviated form in *Academy of Management Executive*, **7**, 41 - 57 (1993), and available as a PDF from WebCourses.
7. R. C. Janssens, "Let's clarify authorship on scientific papers," *Chron. Higher Ed.* (11 Aug. 2014). Available as PDFs on WebCourses.
8. M. Bertolotti, Ch. 12: "The Misfortune (or fortune) of Gordon Gould", in *The History of the Laser* (Institute of Physics Publishing: Bristol, 1999).
9. Selected technical papers, available as PDFs on WebCourses. See course timeline for specifics.

### Recommended References

1. T. S. Kuhn, *Structure of Scientific Revolutions*, 50th Anniversary Edn. (4th edn., Chicago Univ. Press, Chicago, 2012).
2. "Communicating Science: Tools for Scientists and Engineers." (American Association for the Advancement of Science, 2012), <http://communicatingscience.aaas.org>.
3. M. Bertolotti, *The History of the Laser* (Institute of Physics Publishing, Bristol, 2005), ISBN 0 7503 0911 3.
4. C. Hamilton, *Essentials of Public Speaking*, 5th Edition (Cengage Advantage Books, 2012), ISBN-10: 049590113X, ISBN-13: 9780495901136.
5. N. K. Patel, "Technical Presentations", Books 1 - 4 (IEEE-USE E-Books, 2010). "Book 1: Strategy, Preparation, and Planning" is available at: <http://www.cse.ohio-state.edu/~bmathis/2501/Technical-Presentations-Book-1-Strategy-Preparation-and-Planning.pdf>
6. D. H. Schwartz, "Not all scientific studies are created equal." <http://ed.ted.com/lessons/not-all-scientific-studies-are-created-equal-david-h-schwartz>.

### Amendment of Syllabus

The instructor reserves the right to modify the schedule, the testing procedure, and the grading basis if, in the professional judgment of the instructor, such modification is in the best interest of fulfilling the course objectives and assuring the academic integrity of the course and the University.

## Overview of Activities and Assignments

<b>Week</b>	<b>Date</b>	<b>Topics</b>	<b>Presenter</b>	<b>Content</b>	<b>Assignments (due on the day listed)</b>
1	21-Aug	(A) Syllabus and Assignment Review	Dr. Kuebler		- Submit Essay: "Significance of Optics & Photonics"; - Read key sections from Meredith's <i>They Say / I Say</i> (1st two chapters are on WebCourses);
		(B) Historical Perspectives of Optics & Photonics		Lecture slides and discussion.	- Read Whitesides' "Writing a Paper" (WebCourses); - Read Papers 1-2 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses); - Start surveying research topics in CREOL and local optics companies, to select one as the " <b>focus topic</b> " for semester-long writing and presentation assignments.
2	28-Aug	(A) Cont. Historical Perspectives  (B) Literature of Optics & Photonics	Dr. Kuebler	Lecture slides and discussion of the literature, structure of technical papers, abstracts, reports, and lay communication, and EndNote.	- Submit focus topic for semester-long deliverables; - Read C. Jansseens' "Let's clarify authorship on scientific publications." (WebCourses); - Read Papers 3-5 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses); - Start reading Meredith's <i>Explaining Research</i> (due in two weeks); - Start EndNote library.
3	4-Sep	(A) Research Methods I	Patti McCall (UCF Library)	Library tour of resources. <b>Meet in Library, Room TBA.</b>	- Submit 250-word technical abstract on focus topic; - Read Papers 6-8 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses); - Start EndNote library; - Continue reading Meredith's <i>Explaining Research</i> (due next week).
		(B) Written Communication I	Dr. Kuebler	Discussion of the persuasive writing styles and content in <i>I Say / They Say</i>	
4	11-Sep	(A) Research Methods II	Patti McCall (UCF Library)	Conducting a literature search. <b>Meet in normal classroom.</b>	- Submit 250-word layman's abstract of your focus topic; - Start 1000-word essay on focus topic, with figs., and refs. done in EndNote; - Complete reading Meredith's <i>Explaining Research</i> ; - Start reading "On Being a Scientist" (WebCourses).
		(B) Written Communication II	Dr. Kuebler	Importance of proper writing and style, mechanics, common errors.	
5	18-Sep	Spoken Communication (Lecture & Disc.)	Dr. Lindsay Neuberger (Nicholson Sch. Commun.)	Techniques of oral communication. Elevator speech delivery and critique.	- Continue reading "On Being a Scientist" (WebCourses); - Deliver "elevator speech" describing research topic ( <i>circa</i> 60 s, 150 words).
6	25-Sep	(A) Responsible Conduct I	Dr. Kuebler	Lectures slides and discussion	- Submit 1st-draft of 1000-word description of focus topic; - Read Tech-Paper I and complete review per template (WebCourses); - Finish reading "On Being a Scientist" (WebCourses).
		(B) Paper review I			
7	2-Oct	(A) Responsible Conduct II	Dr. Kuebler	Lectures slides and discussion	- Submit final draft of 1000-word essay; - Read Tech-Paper II and complete review per template (WebCourses); - Start PowerPoint presentation (max 10 slides).
		(B) Paper review II			
8	9-Oct	Overview of the Optics & Photonics Industry	Alex Fong	Lecture slides and discussion	- Submit 1st draft of PowerPoint slides; - Optional (and very funny!): Read Dr. R. Trebino's account of his attempt to submit a scientific Comment to a journal, in 123 easy steps (PDF on WebCourses)!

9	16-Oct	Professional Preparation for Industry	Dr. Jason Eichenholz	Lecture slides and discussion	- Submit 2nd draft of PowerPoint slides; - Read article by Capers and Lipton on the Hubble Construction Errors; - Optional: Read Allen Committee HST Optical Systems Failure Report (WebCourses).
10	23-Oct	Intellectual Property	Brion Berman and John Miller	Lecture and discussion of IP, tech transfer, patenting, etc.	- Read Bertolotti's "The Misfortune (or fortune) of Gordon Gould" (see WebCourses); - Read Tech-Paper III and complete review per template (WebCourses).
11	30-Oct	Philosophy of Science and Engineering	Dr. Bruce Janz		- Start Wiki on focus topic; - Create/revise your resume.
12	6-Nov	Entrepreneurship	Dr. Kathleen Richardson and Jennifer McKinley	Round-table discussion.	- Continue work on Wiki; - Create/revise your LinkedIn page.
13	13-Nov	(A) Responsible Conduct III (B) Paper review III	Dr. Kuebler	Lectures slides and discussion	- Submit 1st draft of Wiki on focus/company topic.
14	20-Nov	Student presentations and Wiki's I		Student give oral presentations on their focus topics, including Wikis they have developed.	- Submit 2nd draft of Wiki on focus topic; - Submit final draft of PowerPoint slides.
15	27-Nov	Student presentations and Wiki's II			- Revise final drafts of all deliverables, including CV, LinkedIn page, and EndNote library.
16	4-Dec	<b>Final Exam</b>			- Submit revised/final drafts of all assignments (technical abstract, layman's abstract, 1000-word paper, PowerPoint presentation, Wiki page, 3 Tech-Paper Reviews, CV, EndNote library, & LinkedIn page); - Final exam will be administered in our normal classroom at the usual meeting time of 10:30a - 12:30p.

### Detailed Description of Assignments

Throughout the semester you will be responsible for reading multiple sources, preparing for in-class discussion of these materials, completing written assignment for submission via WebCourses, and delivering presentations during class. The assignments in written, oral, and multi-media communication are designed to focus on a common topic in Optics and Photonics, which you will select. The assignments increase in complexity, length, and the required use of communication methods, so that you can progressively develop your skills throughout the semester.

All assignments will be corrected and returned for your review to help you improve. For lengthier assignments you are asked to submit multiple drafts so the instructor can provide feedback that helps you improve your technique and the quality of the final product. All assignments will be scored according to the rubric in Table 3. Presentations to the class will include a peer-assessment, where classmates provide feedback and help assess the quality of your work. The instructor will consider peer-assessment in determining scores for assignments. Correct use of grammar and spelling is essential. Ten (10) points (out of 100 total) will be deducted for each misuse of grammar and spelling. All assignments are eligible for a re-

submission at the end of the semester, and they will be re-scored in your favor if the final product reflects a marked improvement.

**Table 3.** Rubric for scoring assignments.

	<i>Skill Area</i>	<i>Possible Points</i>
1	Accessibility by the target audience	10
2	Effectiveness in communication (writing structure, development of ideas, etc)	15
3	Professionalism (formatting, neatness, consistency)	15
4	Creativity and/or visual appeal	10
5	Expression of professional ethics and responsibility (including proper use of citations, originality)	15
6	Evidence of multidisciplinary thinking	10
7	Ability to apply knowledge of mathematics, science, and engineering	15
8	Cognizance and communication of constraints associated with a scientific or engineering problem, including those technical, economic, environmental, social, political, ethical, or related to health, safety, manufacturability, and sustainability	10
<b>Total</b>		100

*Less 10% for each incorrect use of grammar or spelling.*

*Less 10% for each day the work is submitted after the due date.*

Many assignments are designed to run over several weeks, or in some cases, throughout the entire semester. The Overview of Activities and listing of assignments below includes start dates and due dates to help you manage your time devoted to this course. Most assignments are due on a Thursday, when our class meets, at 10:30 am. These due dates/times are also posted with each assignment in WebCourses. You will be responsible for carefully monitoring the due dates and ensuring that assignments are submitted on time. Late submissions will be marked down by 10% for each day they are late.

All written assignments should be submitted as Microsoft Word documents via WebCourses. Others types can be submitted as attachments to e-mails sent to the instructor. Submit documents using a sensible filename that includes your name and the name of the assignment.

Assignment 1: The Significance of Optics and Photonics

Format: 250 word essay

Start date: 18 Aug. 2014

Due: 23 Aug. 2014

Description:

Submit a paragraph on WebCourses between 200 and 250 words in length that explains to a lay person why Optics and Photonics (O&P) are significant to modern life. Describe

technologies that are enabled as well as everyday activities that would not be possible without O&P. Use persuasive arguments to convince the reader that O&P are just as important as other high-profile fields, such as cancer research or space exploration. The essay will help the instructor establish the baseline for your current writing skills.

Assignment 2: Class participation  
Start date: 18 Aug. 2014  
Due: Semester-long activity

Description:

Most people learn things for themselves. As a teacher, my job is to help students learn the material and develop their skills. In order to help you learn in depth, I plan to use a significant amount of class time for detailed discussion of concepts and problem-solving. Credit will be given for these activities. These types of activities require that students read all materials prior to class and take notes or consult secondary materials as needed to grasp the concepts. Full credit can only be earned by actively contributing in class, will meaningful responses to questions and discussion that reflect thorough study and comprehension of assigned reading. I will provide regular feedback to students individually concerning the quality of their contributions in class and a final grade will be based on my semester-long assessment of your contributions.

Assignment 3: Select a writing and presentation topic  
Format: Independent investigation and selection of a topic for subsequent writing and presentation through the semester.  
Start date: 18 Aug. 2014  
Due: 28 Aug. 2014

Description:

Throughout the semester, each student will complete a series of short- and long-form assignments that will help them develop their research and communication skills, including writing, oral presentation, and producing and working with audio-visual media. Based on this topic, the students will create (and deliver/present) short technical and layman's abstracts; a 1000-word essay, with figures and complete citations; a 60 second "elevator speech"; a 20 minute multi-media presentation, using PowerPoint slides, animation, etc., with complete citations; and a Wiki page with figures and complete citations. Students may choose for their topic either:

- (1) a research field actively pursued by a CREOL faculty member, or
- (2) the products and services of an Optics and Photonics company associated with CREOL.

During the first week of the semester, survey research descriptions from the CREOL research web pages (<http://www.creol.ucf.edu/Research/>) and the activities of CREOL Industrial Affiliates (<http://www.creol.ucf.edu/Partnerships>), down-select to 1-3 topics of interest and explore more deeply by reading reports/publications by the group/company, reviews, etc; then choose a final topic and submit a short description (25 words or less) by 28 Aug. 2014 via WebCourses.

After submission, continue to investigate your topic in depth as needed to fulfill subsequent assignments. Use a variety of information formats, including published papers, webpages, videos, etc., but also consider interviewing people involved with the selected topic, including the

research faculty member and their graduate students, or in the case of an Industrial Affiliate, contact a representative of the company and interview them about the company's products and services.

Assignment 4: Readings

Start date: 18 Aug. 2014

Due: 21 Aug. 2014

Read the following.

1. Key sections from Meredith's *They Say / I Say* (1st two chapters are on WebCourses).
2. Whitesides' "Writing a Paper" (WebCourses).
3. Papers 1-2 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses).

Assignment 5: Readings

Start date: 21 Aug. 2014

Due: 28 Aug. 2014

Read the following.

1. Read C. Jansseens' "Let's clarify authorship on scientific publications." (WebCourses);
2. Read Papers 3-5 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses);

Assignment 6: Read Meredith's *Explaining Research*

Start date: 28 Aug. 2014

Due: 11 Sept. 2014

Description:

Read the text, taking notes as needed and paying particularly close attention to discussion of:

1. Why effective communication is central to science and engineering;
2. How different communication formats differ;
3. Pitching your presentation appropriately for a given audience;
4. Developing an appropriately limited number of key themes;
5. Communication formats that are relevant to industry.

Assignment 7: 250-word technical abstract

Start date: 28 Aug. 2014

Due: 4 Sept. 2014

Description:

Write a 250-word technical abstract on your focus topic. Submit the work on WebCourses as an MS Word document. Create a professional layout. Include a title, your name, the name of the assignment, and due date. As this is a technical abstract, write it with the expectation that your reader has the education level of an undergraduate in science and engineering or higher, using technical terms as appropriate.

Assignment 8: Readings

Start date: 28 Aug. 2014

Due: 4 Sept. 2014

Read papers 6-8 of C. Mack's series "How to Write a Good Scientific Paper" (available for download from WebCourses).

Assignment 9: Build your own EndNote library  
Format: Semester-long development  
Start date: 4 Sept. 2014  
Due: 4 Dec. 2014



Description:

EndNote is a citation database and management tool that is available for free download via the UCF Library at <http://library.ucf.edu/Databases>. Students will install this tool on their own computers and learn to use it proficiently. Throughout the semester students will build their own EndNote library for all references consulted for their focus topic, and then use it to format citations and bibliographies in all submission. Students will submit the final library to the instructor by email during the final week of the semester but before the day of the final exam.

Assignment 10: 250-word layman's abstract  
Start date: 4 Sept. 2014  
Due: 11 Sept. 2014

Description:

Write a 250-word layman's abstract on your focus topic. Submit the work on WebCourses as an MS Word document. Create a professional layout. Include a title, your name, the name of the assignment, and due date. Write this abstract with the expectation that your reader has no more than a high school level of education. Avoid using technical jargon. The abstract should provide a description that is well balanced between the scientific and/or engineering goals and how these are relevant to the reader as a consumer of science and engineering.

Assignment 11: Read "On Being a Scientist: A Guide to Responsible Conduct in Research"  
Start date: 11 Sept. 2014  
Due: 25 Sept. 2014

Description:

This work is available at [http://www.nap.edu/download.php?record\\_id=12192](http://www.nap.edu/download.php?record_id=12192). Read this text closely, particularly the case studies. Create written answers to the questions and bring these to class for discussion on 25 Sept., 2 Oct., and 13 Nov. 2014.

Assignment 12: 1000-word essay  
Start date: 11 Sept. 2014  
Due: 1st draft -- 25 Sept. 2014  
Final draft -- 2 Oct. 2014

Description:

Write a 1000-word essay on your focus topic for an audience having an undergraduate education in science or engineering. Minimize the use of technical jargon, and provide explanations where technical terms are essential. The work should include a clear explanation of

how the topic is relevant to the reader as a consumer of science and engineering. Include three to five figures, with captions and explicit call-outs to the figures in the main text. Include full citations, formatted using EndNote. You are encouraged to create your own illustrations using PowerPoint or other graphical-editing software. Illustrations should be simple, accurate, and visually appealing. When illustrations or figures are pulled from work by others, include a complete citation. Create a professional layout. Include a title, your name, the name of the assignment, and due date. For guidance on how to create a professional layout for sections, captions, and figures, refer to formats used for Reviews in peer-reviewed journals in our field, such as the *Journal of Optics* (<http://iopscience.iop.org/2040-8986>). You are free to choose any given format, but make sure your formatting is consistent throughout the work.

Assignment 13: Elevator speech

Start date: 11 Sept. 2014

Due: 18 Sept. 2014

Description:

Deliver an "elevator speech" that describes your focus topic within 60 second (*circa* 150 words), using a normal pace of speech. Assume your listener has no more than a high school level of education. Avoid using technical jargon. The speech should explain how research work or industrial products and services are relevant to the listener as a consumer of science and engineering.

Assignment 14: Technical Review I

Start date: 18 Sept. 2014

Due: 25 Sept. 2014

Description:

Read a technical paper in Optics and Photonics and complete a blind review as would a referee upon submission to the journal. Download "Technical Paper I", read it carefully, and look up technical content that is unfamiliar to you. Download "Instructions for Reviewers I" and read the instructions carefully to understand how the content of the paper should be judged and how to complete the written review. Write your review in an MS Word document, following the journal's format, and submit it via WebCourses. Make ancillary notes of instances in which the authors make good use of communication techniques we have studied as well as examples of how they could improve. Be specific in all cases and provide one or two examples in which you have re-written their sentences to improve the communication. Bring a hardcopy of your review and your ancillary notes to class for discussion on the due date.

Assignment 15: Technical Review II

Start date: 25 Sept. 2014

Due: 2 Oct. 2014

Description:

Read a technical paper in Optics and Photonics and complete a blind review as would a referee upon submission to the journal. Download "Technical Paper II", read it carefully, and look up technical content that is unfamiliar to you. Download "Instructions for Reviewers II" and read the instructions carefully to understand how the content of the paper should be judged

and how to complete the written review. Write your review in an MS Word document, following the journal's format, and submit it via WebCourses. Make ancillary notes of instances in which the authors make good use of communication techniques we have studied as well as examples of how they could improve. Be specific in all cases and provide one or two examples in which you have re-written their sentences to improve the communication. Bring a hardcopy of your review and your ancillary notes to class for discussion on the due date.

Assignment 16: PowerPoint slides

Start date: 2 Oct. 2014

Due: 1st draft -- 9 Oct. 2014  
2nd draft -- 16 Oct. 2014  
Final draft -- 20 Nov. 2014

Description:

Create an oral presentation and accompanying PowerPoint slides that describe your focus topic for an audience having an undergraduate education in science or engineering. The presentation should be no more than 20 minutes long and use around 10 - 12 slides. Minimize the use of technical jargon, and provide explanations where technical terms are essential. Explain clearly how the topic is relevant to the listener as a consumer of science and engineering.

Your 1000-word essay is intended to serve as an outline that helps you develop this presentation and from which you may draw content, including figures. Include movies and animation as appropriate. You are encouraged to create your own illustrations and animations using PowerPoint or other graphical software.

The final slide must be a bibliography for all content that is not original to you, including figures, movies, etc. Also include in this list some citations for literature that you read to develop the oral content of your presentation. Within the presentation, include abbreviated citations for content not original to you. For example, if you use a figure from the following paper:

"Z. Luo and S. M. Kuebler, "Axial superresolution of focused radially polarized light using diffractive optical elements," *Opt. Commun.* **315**, 176-182 (2013)."

include this complete citation in the bibliography, and give the following abbreviated citation under the image itself:

"Luo and Kuebler, *Opt. Commun.* (2013)."

Submit drafts of the presentation via WebCourses. Bring your presentation on a thumb-drive for the day of in-class presentations.

Assignment 17: Readings

Start date: 9 Oct. 2014

Due: 16 Oct. 2014

1. Article by R. S. Capers and E. Lipton on the Hubble Construction Errors (WebCourses);
2. Optional: Read Allen Committee HST Optical Systems Failure Report (WebCourses).

Assignment 18: Read M. Bertolotti's "The Misfortune (or fortune) of Gordon Gould"

Start date: 16 Oct. 2014

Due: 23 Oct. 2014

Assignment 19: Wiki on focus topic

Start date: 30 Oct. 2014

Due: 1st draft -- 13 Nov. 2014  
2nd draft -- 20 Nov. 2014  
Final draft -- 4 Dec. 2014

Description:

Create a Wiki page that describes your focus topic for an audience having an undergraduate education in science or engineering. The Wiki should follow the format of a Wikipedia page and be roughly 1000 words in length and contain between three and five figures. Minimize the use of technical jargon, and provide explanations where technical terms are essential. Explain clearly how the topic is relevant to the reader's everyday life. Your 1000-word essay and PowerPoint presentations are intended to serve as outlines that help you develop the Wiki and from which you may draw content, including figures. Include figures, photos, movies, and animation as appropriate. You are encouraged to create your own illustrations and animations using PowerPoint or other graphical software.

CREOL's IT Director, Dr. Deon Frank ([dfrank@creol.ucf.edu](mailto:dfrank@creol.ucf.edu), <http://www.creol.ucf.edu/People/Details.aspx?PeopleID=1>), will provide technical assistance to us for developing the Wikis. More details concerning the portal to use for constructing the Wiki will be provided later in the course.

Assignment 20: Resume

Start date: 30 Oct. 2014

Due: 4 Dec. 2014

Description:

Create/revise your resume, applying guidance provided by our industry speakers.

Assignment 21: LinkedIn page

Start date: 6 Nov. 2014

Due: 4 Dec. 2014

Description:

Create/revise your LinkedIn page, applying guidance provided by our industry speakers. Send "Follow" request to the instructor so that he/she may review and critique your page.

Assignment 22: Technical Review III

Start date: 6 Nov. 2014

Due: 13 Nov. 2014

Description:

Read a technical paper in Optics and Photonics and complete a blind review as would a referee upon submission to the journal. Download "Technical Paper III", read it carefully, and look up technical content that is unfamiliar to you. Download "Instructions for Reviewers III" and read the instructions carefully to understand how the content of the paper should be judged

and how to complete the written review. Write your review in an MS Word document, following the journal's format, and submit it via WebCourses. Make ancillary notes of instances in which the authors make good use of communication techniques we have studied as well as examples of how they could improve. Be specific in all cases and provide one or two examples in which you have re-written their sentences to improve the communication. Bring a hardcopy of your review and your ancillary notes to class for discussion on the due date.

Assignment 23: Final exam

Format: In-class essay-style exam with short and long-response questions

Time: 10:30 am - 12:20 pm (usual class time)

Date: 4 Dec. 2014

Location: CREOL 103

Description:

The final exam will be comprehensive to all topics covered in the course. Students will be asked to apply communication skills developed throughout the semester to answer questions related to historical perspectives of O&P; the O&P industry; publication and the technical literature; communication techniques; professional ethics and responsibility; professional preparation; and how their technical field is connected with issues like manufacturability, sustainability, health and safety, and other economic, environmental, social, or political constraints.