



Syllabus updated on 25 Aug. 2015 for

Frontiers in Optics – OSE 4930.0001 – Fall 2015 – 2 credit hrs.

Instructor:	Dr. Stephen M. Kuebler	Term:	Fall 2015
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Phone:	407-823-3720	Class time:	1:00 pm - 2:50 pm
Office:	Phys. Sci. Bldg, Room 347	Class location:	CREOL 102
Office hours:	Mon & Wed 8:30a - 11:00a	Website:	On WebCourses

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).

Detailed Course Description

This course introduces the students to recent advances in optics & photonics. Students will read selected articles in technical magazines and journals (e.g., *J. Modn. Opt.*, *J. Opt. Soc. Amer.*, *Optics and Photonics News*, *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 following topics.

- 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 portfolio 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.

Learning Outcomes and Measures

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

	Graduates will have the ability to apply knowledge of mathematics, science, and engineering.		
Outcome: 6	Graduates will have an understanding of professional and ethical responsibility		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	6.1	OSE 4930 Frontiers of Optics and Photonics: 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	Graduates will have the ability to communicate effectively.		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	7.1	OSE 4930 Frontiers of Optics and Photonics: 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	OSE 4930 Frontiers of Optics and Photonics: 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	Graduates will have the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal contexts.		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	8.1	OSE 4930 Frontiers of Optics and Photonics: 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	Graduates will have recognition of the need for, and the ability to engage in life-long learning.		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	9.1	OSE 4930 Frontiers in Optics and Photonics: 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	Graduates will have knowledge of contemporary issues.		
	<i>Measure</i>	<i>Course and Faculty Outcome Results</i>	<i>Performance Criteria</i>
	10.1	OSE 4930 Frontiers of Optics and Photonics: 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	OSE 4930 Frontiers of Optics and Photonics: 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.	Strong
(b) An ability to design and conduct experiments, as well as to analyze and interpret data.	Moderate
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	Strong
(d) An ability to function on multidisciplinary teams.	Strong
(e) An ability to identify, formulate, and solve engineering problems.	Strong
(f) An understanding of professional and ethical responsibility.	Strong
(g) An ability to communicate effectively.	Strong
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	Strong
(i) A recognition of the need for, and an ability to engage in life-long learning.	Strong
(j) A knowledge of contemporary issues.	Strong
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	Moderate

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

WebCourses and Web Resources

This syllabus, other course materials, and assignments are available 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 at the start of the semester and several times with drafts for review 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 for longer-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

This class is intended to 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), 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.

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) 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.

Table 1. Weighting of assignments.

	<i>Component</i>	<i>Weighting</i>
1	Participation in class (incl. outside reading, study, and preparation)	10%
2	Short-form assignments (Significance-of-Optics paragraph, Focus Topic, Abstracts, and Elevator Speech, each weighted equally)	10%
3	Professional development tools (Resume, LinkedIn Page, EndNote Library, each weighted equally)	10%
4	Reviews of technical papers (each weighted equally)	10%
5	1000-word Essay on Focus Topics	15%
6	Multi-Media Presentation	15%
7	Oral delivery of multi-media presentation	10%
8	Final Exam	20%
Total		100%

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 +	Satisfactory. 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 satisfactory 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.

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.

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

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 during Week #1*** of the semester. Failure to do so could delay the disbursement of your financial aid.

Plagiarism Checking and TurnItIn.com

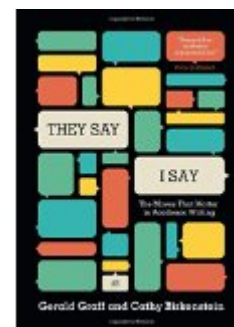
In this course we will utilize TurnItIn, an automated system which instructors can use to compare each student assignments quickly and easily with billions of web sites, as well as an enormous database of student papers that grows with each submission. You will submit all assignments electronically through WebCourses. Submissions will be automatically run through TurnItIn. After the assignment is processed, the instructor receives a report that states if and how another author's work was used in the assignment. For a more detailed look at this process, please visit <http://www.turnitin.com>. Plagiarism is academic misconduct that incurs penalties as discussed above.

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.

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 (~\$22). Note that the version "With Readings" is more expensive, and not required.
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.
4. C. Mack, "How to Write a Good Scientific Paper", Series of eight (8) 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. "Communicating Science: Tools for Scientists and Engineers." (American Association for the Advancement of Science, 2012), <http://communicatingscience.aaas.org>.
2. M. Bertolotti, *The History of the Laser* (Institute of Physics Publishing, Bristol, 2005), ISBN 0 7503 0911 3.
3. C. Hamilton, *Essentials of Public Speaking*, 5th Edition (Cengage Advantage Books, 2012), ISBN-10: 049590113X, ISBN-13: 9780495901136.
4. 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>
5. 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>.

Timeline of Activities and Assignments

Week	Date	Topics	Presenter	Content	Assignments (due on the day listed)
1	28-Aug	(A) Syllabus & Assignment Review	Dr. Kuebler	- Discuss course content and focus-topic for scaffolded assignments.	- Submit Essay: "Significance of Optics & Photonics". - Submit "Focus Topic" for scaffolded assignments. - Start EndNote library (http://guides.ucf.edu/citations-endnote)
		(B) Optics Literature (C) Ethics in Publication & Handling Data		- Discuss optics lit., structure of technical papers, abstracts, reports, lay commun., & EndNote.	
2	4-Sep	Literature Research Methods and Resources Meet at Library, circulation desk.	Ms Patti McCall (UCF Library)	Conducting a literature search and tour of library resources.	- Submit Technical Abstract of Focus Topic. - Read selected sections from Graff and Birkenstien's "They Say / I Say". - Continue studying focus-topic and updating EndNote library.
3	11-Sep	Spoken Communication	Dr. Lindsay Neuberger (Nicholson Sch. Commun.)	Techniques of oral communication. Elevator speech delivery and critique.	- Submit Layman's Abstract of your Focus Topic. - Deliver in class an "elevator speech" describing your focus-topic (circa 60 s, 150 words). - Read Chs. 1-3 of Meredith's "Explaining Research".
4	18-Sep	Written Communication	Dr. Kuebler	Discuss persuasive writing styles and content in "I Say / They Say" and writing mechanics.	- Submit EndNote library for review and feedback. - Start outline for 1000-word article on focus topic, with figs., and refs. done in EndNote. - Read Chs. 4-6 of Meredith's "Explaining Research".
5	25-Sep	Preparation for Industry	Steve Frey, VP of Technology, Ocean Optics	- Tour Ocean Optics. - Discuss preparing for industry, led by Steve Frey.	- Submit outline for 1000-word article on focus topic. - Read Papers 1-2 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses).
6	2-Oct	Philosophy of Science and Engineering	Dr. Bruce Janz and Dr. Jonanthan Beeber (UCF Philosophy Dept.)	- Discussion of the scientific method, how it has evolved, and how we use it to generate knowledge and advance technology.	- Submit 1st-draft of 1000-word article on focus topic. - Read Papers 3-5 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses).
7	9-Oct	Opportunities in the Optics & Photonics Industry	Dr. Alex Fong	Overview & discussion of the global and local optics industry.	- Submit 2nd-draft of 1000-word article on focus topic. - Read Papers 6-8 of C. Mack's series "How to Write a Good Scientific Paper" (WebCourses).
8	16-Oct	Historical Perspectives and Milestones in Optics and Photonics	Dr. Kuebler		- Submit final draft of 1000-word article on focus topic. - Read C. Jansseens' "Let's clarify authorship on scientific publications." (WebCourses).
9	23-Oct	(A) Critical Analysis of the Scientific Literature I			- Start PowerPoint slide presentation (max 8 slides). - Read Tech-Paper I and submit completed review per template (WebCourses).
		(B) Responsible Conduct I			- Read "On Being a Scientist" (WebCourses). Note: Kuebler at Frontiers in Optics conference 18-22 Oct.
10	30-Oct	Intellectual Property	Brion Berman and John Miner, UCF Off. Research & Commercialization		- Read Bertolotti's "The Misfortune (or fortune) of Gordon Gould" (see WebCourses). - Submit 1st draft of PowerPoint slides.

11	6-Nov	(A) Critical Analysis of the Scientific Literature II			- Read Tech-Paper II and submit completed review per template (WebCourses). - Submit 2nd draft of PowerPoint slides.
		(B) Responsible Conduct II			
12	13-Nov	Preparation for Industry	Dr. Clara Rivero-Baleine (Research Scientist, Lockheed-Martin	- Tour Lockheed. - Discuss preparing for industry, led by Dr. Rivero-Baleine.	- Submit final draft of PowerPoint slides. - Start/revise resume.
13	20-Nov	Student Presentations I		6 student (to be assigned) give oral presentations on their focus topics.	- Submit first draft of resume. - Start LinkedIn page.
14	27-Nov	Thanksgiving Break		Class does not meet but assignments are due.	- Submit print-out of LinkedIn page. - 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)!
15	4-Dec	Student Presentations II		6 student (to be assigned) give oral presentations on their focus topics.	- Submit final EndNote library and final draft of resume.
16	11-Dec	Final Exam		1:00 PM – 2:50 PM; Friday 11 Dec. 2015	- Optional: submit revised versions of all assignments. These will be re-scored if they demonstrate improvement.

Detailed Description of Assignments

Throughout the semester you are 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 will expand on a "Focus Topic" in Optics and Photonics, which you will select (see Assignment 3). The assignments are "scaffolded" – increasing in complexity, length, and the required use of communication methods – so that you can progressively develop your skills throughout the semester.

Scoring assignments. All assignments will be evaluated and returned for your review to help you improve your skills. 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. The rubric maps to the specific learning objectives associated with this course. 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. 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.

Due dates. Many assignments are designed to run over several weeks, or in some cases, throughout the entire semester. The *Timeline of Activities* above 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 when our class meets. These due dates/times are also posted with each assignment in WebCourses. You are 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.

Formatting. For all assignments, add a clear and professional header to the document that provides a) your name, b) the assignment number, c) the name of the course, and d) the semester.

You are free to create your own format, but make it professional, as if it were being submitted it to a supervisor in a company. This will help you to begin developing professional habits that serve you throughout your career. Follow any additional formatting requirements required as detailed in the assignment descriptions below.

Submission. All written assignments should be submitted as Microsoft (MS) 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.

Table 3. Rubric for scoring assignments.

	<i>Skill Area</i>	<i>Possible Points</i>
1	Knowledge of professional ethics and responsibility (Through discussion of topic, and/or mechanics, e.g., proper use of citations, handling data, etc.).	15
2	Effectiveness in communication (Expression of ideas, accessibility by the target audience, clarity, conciseness).	20
3	Knowledge of the historical perspective of optics and photonics and the societal impact of recent advances in the field.	15
4	Creativity, originality, and ability to self-learn.	15
5	Technical understanding of the field (e.g., technical content, thoroughness of research, knowledge of products, intellectual property, and research and development).	15
6	Professionalism (e.g., proper use of formatting, spelling, neatness, consistency)	20
Total		100

**Less 10% for each day an assignment is submitted past the due date.*

Assignment 1: Short Essay: The Significance of Optics and Photonics

Format: 250 word essay

Start date: Start of semester

Due: Week 1, class day

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. Create a professional layout. Include a title, your name, the name of the assignment, and due date. In the abstract, 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: Start of semester

Due: Semester-long activity

Description:

Most people learn things for themselves. The teacher's job is to help students learn the material and develop their skills. To help you learn, we will use class time to discuss concepts. Credit will be awarded 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, with meaningful responses to questions and discussion that reflect thorough study and comprehension of the assigned reading. The instructor will provide regular feedback to students individually concerning the quality of their contributions in class, and the final score will be based on a semester-long assessment of your contributions.

Assignment 3: Focus Topic

Format: Independent investigation and selection of a topic for subsequent writing and presentation through the semester.

Start date: Start of semester

Due: Week 1, class day

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"; and a 15 minute multi-media presentation, using PowerPoint slides, animation, etc., with complete citations. Students may choose for their topic either:

- (1) a research field actively pursued by a CREOL faculty member, or
- (2) the products or 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) 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: EndNote library

Format: Semester-long development

Start date: Start of semester

Due: Week 4, class day -- Submit for review/feedback
Week 15, class day -- Submit final version

Description:

EndNote is a citation database and management tool that is available for free download via the UCF Library at <http://guides.ucf.edu/citations-endnote>. 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 library by email periodically throughout the semester for review and feedback, and the final version will be submitted for scoring on or before the day of the final exam.



Assignment 5: Technical abstract

Start date: Week 1, class day

Due: Week 2, class day

Description:

Write a 250-word technical abstract on your Focus Topic. Submit the work on WebCourses as an MS Word document. 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. Create a professional layout. Include a title, your name, the name of the assignment, and due date.

Assignment 6: Graff & Birkenstein's *They Say / I Say*

Start date: Week 1, class day

Due: Week 2, class day

Read the following sections. The first two chapters are also on WebCourses.

- 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.

Assignment 7: Layman's abstract

Start date: Week 2, class day

Due: Week 3, class day

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 8: Elevator speech

Start date: Week 2, class day

Due: Week 3, class day

Description:

Prepare, practice, and 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 9: Readings: Meredith's *Explaining Research*

Start date: Week 2, class day

Due: Week 3, class day -- Chs. 1-3.

Week 4, class day -- Chs. 4-6.

Description:

Read the text, *take notes*, and bring the notes to class for discussion. Pay particularly close attention to the 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 10: 1000-word essay on Focus Topic

Start date: Week 4, class day

Due: Week 5, class day -- submit outline

Week 6, class day -- submit 1st draft

Week 7, class day -- submit 2nd draft

Week 8, class day -- submit final draft

Description:

Write a 1000-word essay on your Focus Topic for an audience having an undergraduate education in science or engineering. First create and submit an outline. Next generate and submit drafts per the due-dates listed above.

For the outline, use a professional format, such as that promoted by the Modern Language Association (MLA, <http://academictips.org/mla-format/mla-format-sample-paper-with-cover-page-and-outline/>). For the drafts, create a professional layout for sections, captions, and figures. Follow the formats recommended by 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*. For all submissions, include a coversheet with the title, your name, the name of the assignment, and due date.

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.

Assignment 11: Readings: C. Mack's series "How to Write a Good Scientific Paper"

Start date: Week 4, class day

Due: Week 5, class day -- Papers 1 - 2
Week 6, class day -- Papers 3 - 5
Week 7, class day -- Papers 6 - 8

Description:

Read C. Mack's series "How to Write a Good Scientific Paper" (WebCourses). Think critically about how the best practices described by Mack are or are not implemented in works that you read for your Focus Topic and the Technical Paper Reviews (see below).

Assignment 12: Readings: C. Jansseens' "Let's clarify authorship on scientific publications."

Start date: Week 7, class day

Due: Week 8, class day

Description:

Read C. Jansseens' "Let's clarify authorship on scientific publications." (WebCourses). Note the arguments that are made for how authorship has ethical implications and what the responsibilities are of a scientist/engineer when they author work, particularly when others have contributed to the work in various ways.

Assignment 13: Reading: "On Being a Scientist: A Guide to Responsible Conduct in Research"

Start date: Week 8, class day

Due: Week 9, class day

Description:

This work is available at 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 weeks labelled "Responsible Conduct" in the Timeline of Activities and Assignments.

Assignment 14: PowerPoint Slides and Oral Presentation

Start date: Week 9, class day

Due: Week 10, class day -- 1st draft of Slides

Week 11, class day -- 2nd draft of Slides

Week 12, class day -- final draft of Slides

Weeks 13 & 15 -- deliver oral presentation (each student will be assigned a day)

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 15 minutes long and use about 8 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 15: Technical Review I

Start date: Week 8, class day

Due: Week 9, class day

Description:

Download "Technical Paper I", read it carefully, and look up technical content that is unfamiliar to you. Download "Review I Guidelines (Template)" 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: Read M. Bertolotti's "The Misfortune (or Fortune) of Gordon Gould"

Start date: Week 8, class day

Due: Week 9, class day

Description:

Read M. Bertolotti's "The Misfortune (or Fortune) of Gordon Gould" (WebCourses). Note how credit for research and publication differ from that associated with inventorship, and how complex the assignment of credit for inventorship can become. Note also how credit for inventorship can obscure the huge contributions to a field made by others who may not be directly known or associated with an invention in question.

Assignment 17: Technical Review II

Start date: Week 10, class day

Due: Week 11, class day

Description:

Download "Technical Paper II", read it carefully, and look up technical content that is unfamiliar to you. Download "Review II Guidelines (Template)" 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 18: Resume

Start date: Week 12, class day

Due: Week 13, class day -- 1st draft
Week 15, class day -- final draft

Description:

Read "A Curriculum Vitae Makeover" (on WebCourses) by M. Weed (a graduate of CREOL) and J.-L. Doumont, published in *Opt. Photonics. News*, Mar. 2013, pp. 20-22. Then create/revise your resume, applying guidance provided by our industry speakers.

Assignment 19: LinkedIn page

Start date: Week 13, class day

Due: Week 14, class day

Description:

Create/revise your LinkedIn page, applying guidance provided by our industry speakers, and using content from your resume. Send "Follow" request to the instructor so that he/she may review and critique your page. Submit a print-out of your LinkedIn page via WebCourses.

Assignment 20: Optional reading -- but well worth it, and very funny!

Start date: Week 14, class day

Description:

Read M. R. Trebino's account of his attempt to submit a scientific Comment to a journal, in 123 easy steps (on WebCourses)! Dr. Rick Trebino (Elec. Eng., GaTech) is one of the top scientists in the field of nonlinear optics and characterizing ultrashort pulses. His article is a satirical account of his less-than-perfect experiences with publishing peer-reviewed work. Dr. Trebino is an incredibly creative scientist, and equally effective as a humorist. Enjoy!

Assignment 21: Final exam

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

Time: Usual class time

Date: See Timeline above

Location: Normal class room

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.