UNIVERSITY OF CENTRAL FLORIDA

OSE 4951 - Senior Design I

Section: 0001

Optics and Photonics

Course Information

Term: Spring 2026
Class Meeting Days: TR
Class Meeting Time: 09:00AM - 10:15AM
Class Meeting Location: ENG2 0102
Modality: P
Credit Hours: 3.00

Instructor Information

Name: Paul Leisher
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Monday - 9:00AM to 11:00AM
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Course Description

OSE 4951 OPTIC 3(3,0)Senior Design I: PR: OSE 3200, OSE 3053, OSE 4410, EEL 3307C, and C (2.0 GPA) or higher in OSE 3052. Department Consent. PR/CR: OSE 4520 and OSE 4470 Development of the technical, communication, and team skills for successful design of optical and photonic systems. Preparation of project proposals for Senior Design II. Fall, Spring

The Senior Design courses are intended to serve as capstone courses for the Bachelor of Science Degree in the Photonic Science and Engineering. These courses subject the students to an environment unlike majority of their previous curriculum. Students will encounter aspects of engineering design not found in prior course works. Students will be responsible for their own learning as a team. In other classes, students are given homeworks, quizzes, labs and tests in a structured and scheduled manner, but in Senior Design it is the team's responsibility to schedule their project, assign responsibilities, build the functioning device or system that meets specifications, document the results of the team's efforts in written reports.

Student Learning Outcomes

After successful completion of this course, students will be able to:

- Identify specific goals of the designed system, including specifications and realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints,
- Collect information on available components and standards related to design needs,

- Develop appropriate models and using computer tools for system analysis,
- Perform testing and failure analysis,
- Prepare written proposals and deliver technical information through oral presentations, reports and logbooks,
- Work in a team environment,
- Recognize and address ethical issues related to design and engineering,
- Develop customer relationships and mentality.

Required Course Materials and Resources

None

Recommended Course Materials

Title: DESIGN FOR ELECTRICAL AND COMPUTER ENGINEERS, McGraw¬Hill (Ch. 3), Recommended

Title: SENIOR DESIGN FOR ELECTRICAL AND COMPUTER ENGINEERINGS STUDENTS, Pearson Custom Publishing (3 chapters), Recommended

Title: Varies by Project, Circuit Simulation Software, Schematic Capture Software, PCB Software, Matlab, Zeemax, Light Tools, etc., Recommended

Course Assessment and Grading Procedure

Attendance: The Final Grade will be based on your attendance, exam performance, presentation performance, and final project documentation. Attendance in-person is mandatory and failure to meet this requirement may result in one letter grade deduction in the Final Grade. In addition, failure to comply with course requirements or expectations may further lower your grade as determined to be appropriate by the instructor. Any act of academic dishonesty or unprofessional behavior will result in a failing grade on an exam or in the course.

Project review meetings: As the semester progresses, each student group must schedule Project Review meetings, such as Project Idea (Divide and Conquer) Review meetings, by ensuring that Dr. Leisher and one of the instructors of EEL 4914 can attend each meeting. The OSE students of each group must confirm the time with Dr. Leisher before setting up an appointment with the instructors of EEL 4914. Failure to do so may result in one letter grade deduction from the Final Grade of each photonics student in the group. Include your Group number on the subject line in all emails to the instructors.

The final grade will be primarily based on the final project documentation and the prototyping and testing of critical project elements. However, the overall course grade may be modified by attendance and by performance in other elements that are submitted for grading as well as for instructors' review, including the initial project idea report, initial project documentation, several draft reports, and quizzes given on the course material. No grades are assigned for each of these elements, only indications of completion are recorded. All course elements are evaluated by the course instructor. All team members are usually awarded the same grade, however, under certain circumstances team members may receive different grades. In cases where group members do not adequately contribute to the project, members may be dropped from the group and those students will receive an F grade for the course.

Outline of Senior Design I (SD1) Grading Rubrics: Due to the complex nature of senior design, the Grading Rubrics may not cover all eventualities. The students should use it as a general guideline to understand the grading policy for the SD1 course.

> ***Group Base Grade (GBG):*** The base grade for a group in SD1 is determined by three factors: (1) Is the project running on time? (2) Does the project contain substantial design? (3) Do the reports meet the requirements? In an A grade report, we need to see the evidence of all the above.
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> Is the project running on time? At the end of SD1, each team must show evidence of prototyping and testing of the critical components and subsystems identified with the Photonics Senior design instructor in week 6. This testing must be sufficient to assure the instructors that the project has a good chance of working by the end of senior design 2. If this criterion is not met, the photonics students may have to repeat senior design 2.

Does the project contain substantial design? If the project does not contain substantial design, (particularly optical/photonics design for PSE students and PCB design for ECE students), then the whole project will run into problems in SD2. ECE students must go beyond amateurish or hobbyist-like activities. For example, today, a hobbyist can spend several afternoons to order a few development boards and download a few software programs to perform some nice functions or demonstrate some nice actions. But these hobbyists typically have no idea what are behind these boards and software. Similarly, you can buy photodiodes, LEDs, lasers, etc. that come with spec sheets that offer up circuit designs. You, as a photonics engineer, must add something more than this. Your project must, to some extent, rely on the advanced concepts you have learned in your photonics coursework. If the photonics part of the project is something an electrical engineer could have done, then it is not going to merit an A-grade. Also, your ECE team members must comply with the ECE Major PCB policy, that is, each team must have substantial PCB design and implementation in their project. To ensure this, at the end of SD1, we must see in the A grade report substantial schematic design which can be turned into PCB layout in SD2.

Does the report meet the final report requirement? Details can be found in Project Documentation Guidelines. In summary, length: 30 originally authored pages per person; line space: 1; page size: 8.5” x 11”, with 1” margins (top, right, and bottom), 1.5” left for binding; paragraph: fully justified. Starting from Executive summary, containing Standard and design constraints. Content that is superfluous, irrelevant, or does not directly relate to your project will not be counted towards the page count. In summary, put limitation on the following: white spaces, copy of data sheet material and tutorial material, photos of common items, debug windows, software codes, etc.

***Group Final Grade (GFG)*:** After deciding the GBG, the instructor will check the following items to determine GFG. Failure to meet the following requirement (any one aspect) will result one letter grade deduction from GBG. Multiple failures may result multiple letter grade deductions.

Was the SD1 final report submitted on time? (Hard copy, softcopy). Were all group activities on time? (Divide and Conquer submission and team meeting on time? 60 page, 100-page Draft document submission on time, sufficient page, and meeting on time?).

Individual Grade (IG): The Instructors will further check the following factors to determine individual grades:

Successful prototyping and testing of critical photonics components and subsystems. – The photonics students in a group are responsible for this and may receive grade deductions if this is not satisfactorily carried out.

Attendance at “ABET” classes, bootcamp, and Team meetings with instructors (late or absence). Each absence may result one letter grade deduction and can be cumulative.

Passing quizzes. Failure to pass one quiz may result one letter grade deduction, which can be cumulative.

Instructors' judgement based on the entire SD1 performance of each individual or group peer review form. The Instructor may request each individual member in a team to submit his or her individual portion of contribution to the teamwork or use the Group Peer Review Form. These mechanisms aim to identify those individuals who substantially fail to deliver their parts of work in SD1. Consequently, some individuals may be removed from the team and they will have to retake the Senior Design course in a future semester.

Grading Scale

Letter Grade	Percentage
A	90% -100%
B	80% - Below 90%
C	70% - Below 80%
D	60% - Below 70%
F	Below 60%

Policies for Course Grade

Make-up Work Policy: Make-ups for assignments are only allowed for special or genuine extenuating circumstances. Per university policy, students must be allowed to turn in make-up work for university-sponsored events, religious observances, or legal obligations such as jury duty. For all other circumstances, the instructor has the

final authority to decide whether a make-up is allowed. To be considered for any make-up assignments, students must report to the instructor within 24 hours before or after the missed assignment, and provide justification with appropriate documents.

Missed/Late Assignments: Missed/Late assignments will lead to letter grade deductions. Details are described in the Grading Rubrics.

Attendance: Attendance in classes, bootcamp, and group meetings are all required. A missed attendance with a valid reason can be considered for an override. The instructor has the final authority to decide whether an override is allowed. To be considered for an override, students must report to the instructor within 24 hours before or after the missed attendance, and provide justification with appropriate documents.

Artificial Intelligence (AI) Use Policy

Policy on the use of large language models (LLMs) / ChatGPT

In Senior Design, we encourage students to learn and use the latest technology, including artificial intelligence (AI) large language models (LLMs) such as ChatGPT. However, a key outcome of the capstone senior design experience is gaining experience and developing skills in technical report writing (including proposals, specifications, and technical reports). As such, it is expected that most (if not all) of the writing for this course will be generated by you, not an AI LLM. To this end, we have adopted the following policies regarding the use of AI LLMs (e.g. ChatGPT) in OSE 4951.

1. Unless otherwise explicitly stated, LLMs (e.g. ChatGPT) may be used to assist you in your efforts in this course. Such use must be appropriately cited in your teams' work product – include the LLM source / version used, prompt, date, and a brief description of how the output was used in the work product.
2. Examples of positive use of LLMs in Senior Design include the following: helping to generate project ideas, assisting in summarizing and comparing tradeoffs between various options, generating possible troubleshooting tips for problems encountered, outlining discussion points in your reports, suggesting

and summarizing references which you will use in reports, proofreading and improving language of original paragraphs that you have written.

3. LLMs (e.g.) may not be used to directly generate paragraphs or sections of reports and other work products.
4. Each team is responsible for the veracity of any information which was generated by LLMs (e.g. ChatGPT) and subsequently used in a work product. There will be absolutely no tolerance in graded work for erroneous information generated by LLMs – if you are going to use these tools, you are accepting responsibility for the quality of the output they provide.

For the avoidance of doubt, the instructor(s) of OSE 4951 will not be relying on AI detection tools to ensure compliance with the above policies. We understand that such tools provide at best an imperfect measure (and more commonly, a terrible measure) of the degree to which LLMs (e.g. ChatGPT) have been used in the generation of the work product being graded. However, the instructor(s) of OSE 4951 continue to reserve the right to utilize software tools (such as TurnItIn) for detection of plagiarism.

Disability Access & Accommodations

The University of Central Florida is committed to providing equal access to all students with disabilities (ADHD, learning disabilities, Autism, chronic medical conditions, physical disabilities, etc.). To receive consideration for reasonable disability-related course accommodations, disabled students must contact Student Accessibility Services (SAS) and complete the steps required for SAS to review accommodation requests. More information can be found on the UCF Student Accessibility Services website under the Start Here tab or by contacting SAS directly (Ferrell Commons 185; sas@ucf.edu; Phone - 407-823-2371).

Approved accommodations are shared with course instructors via the SAS Course Accessibility Letter. Implementing certain accommodations may require discussion about specific considerations of the course design, course learning objectives, and the individual academic and course challenges experienced by the student. While students with disabilities or chronic health needs are also encouraged to discuss any

course concerns with professors in addition to contacting SAS, professors are not required to facilitate disability-related adjustments to the course unless the professor has received a Course Accessibility Letter from SAS that outlines approved accommodations.

Academic Integrity

Students should familiarize themselves with UCF's Code of Conduct at Student Conduct and Integrity Office. According to Section 1, "Academic Misconduct," students are prohibited from engaging in:

1. Academic misconduct is defined as any submitted work or behavior that obstructs the instructor of record's ability to accurately assess the student's understanding or completion of course materials or degree requirements (e.g., assignment, quiz, and/or exam). Examples of academic misconduct include but are not limited to: plagiarism, unauthorized assistance to complete an academic exercise; unauthorized communication with others during an examination, course assessment, or project; falsifying or misrepresenting academic work; providing misleading information to create a personal advantage to complete course/degree requirements; or multiple submission(s) of academic work without permission of the instructor of record.
2. Any student who knowingly helps another violate academic behavior standards is also in violation of the standards.
3. Commercial Use of Academic Material. Selling of course material to another person and/or uploading course material to a third-party vendor without authorization or without the express permission of the University and the instructor of record. Course materials include but are not limited to class notes, the instructor of record's slide deck, tests, quizzes, labs, instruction sheets, homework, study guides, and handouts.
4. Soliciting assistance with academic coursework and/or degree requirements. The solicitation of assistance with an assignment, lab, quiz, test, paper, etc., without authorization of the instructor of record or designee is prohibited. This includes but is not limited to asking for answers to a quiz, trading answers, or offering to pay another to complete an assignment. It is considered Academic Misconduct to solicit assistance with academic coursework and/or degree

requirements, even if the solicitation did not yield actual assistance (for example, if there was no response to the solicitation).

Responses to Academic Dishonesty, Plagiarism, or Cheating

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, *The Golden Rule*. UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and respond to academic misconduct when necessary. Penalties for violating rules, policies, and instructions within this course can range from a zero on the exercise to an "F" letter grade in the course. In addition, an Academic Misconduct report could be filed with the Office of Student Conduct and Academic Integrity, which could lead to disciplinary warning, disciplinary probation, or deferred suspension or separation from the University through suspension, dismissal, or expulsion with the addition of a "Z" designated on one's transcript.

Being found in violation of academic conduct standards could result in a student having to disclose such behavior on a graduate school application, being removed from a leadership position within a student organization, the recipient of scholarships, participation in University activities such as study abroad, internships, etc.

Let's avoid all of this by demonstrating values of honesty, trust, and integrity. No grade is worth compromising your integrity and moving your moral compass. Stay true to doing the right thing: take the zero, not a shortcut.

Title IX

Title IX prohibits sex discrimination, including sexual misconduct, sexual violence, sexual harassment, and retaliation. If you or someone you know has been harassed or assaulted, you can find resources available to support the victim, including confidential resources and information concerning reporting options at Let's Be Clear and UCF Cares.

For more information on access and community engagement, Title IX, accessibility, or UCF's complaint processes contact:

- Title IX – ONAC – Office of Nondiscrimination & Accommodations Compliance & askanadvocate@ucf.edu
- Disability Accommodation – Student Accessibility Services – Student Accessibility Services & sas@ucf.edu
- Access and Community Engagement (including the Ginsberg Center for Inclusion and Community Engagement, Military and Veteran Student Success, and HSI Initiatives)
- UCF Compliance and Ethics Office – Compliance, Ethics, and Risk Office & complianceandethics@ucf.edu
- The Ombuds Office is a safe place to discuss concerns.

Reporting an Incident or Issue

If you believe you have experienced discrimination by any faculty or staff member, contact the Office of Nondiscrimination & Accommodations Compliance via the ONAC website or at 407-823-1336. You can also choose to report using the UCF Integrity Line either anonymously or as yourself at 1-855-877-6049 or by using the online form. UCF cares about you and takes every report seriously. For more information see the Reporting an Incident or Issue Webpage.

Deployed Active-Duty Military Students

Students who are deployed active-duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make arrangements.

Campus Safety

At UCF's Public Safety and Police, safety is the top priority. Emergencies on campus are rare, but if one should arise, it's important to be familiar with some basic safety and security concepts.

- In an emergency, always dial 911.

- Every UCF Classroom has an Emergency Procedure Guide posted on a wall near the door, which will show you how to respond to a variety of situations. This guide can also be found online here.
- In the event of an active threat, remember **AVOID, DENY, DEFEND**. Choose the best course of action and act immediately. Watch the video here to learn more.
    - **AVOID**. Pay attention to your surroundings and have an exit plan. Get as much distance and as many barriers between you and the threat as quickly as possible.
    - **DENY**. When avoiding is difficult or impossible, deny the threat access to you and your space. Lockdown by creating barriers, turning the lights off and remaining quiet and out of sight. Make sure your phone is silenced, but do not turn it off.
    - **DEFEND**. When you are unable to put distance between yourself and the threat, be prepared to protect yourself. Commit to your actions, be aggressive and do not fight fairly. Do whatever it takes to survive.
- For emergencies on campus, UCF will utilize the UCF Alert system. All UCF students, faculty, and staff are automatically enrolled to receive these email and text alerts, however, it's a good idea to frequently ensure your contact information is up to date.

Financial Aid Accountability

All instructors are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete this activity by the end of the first week of classes or as soon as possible after adding the course. Failure to do so may result in a delay in the disbursement of your financial aid.

Class Schedule

Week	Topic
1	Introduction, syllabus, project idea
2	Group formation, divide & conquer approach

Week	Topic
3	Project selection, Engineering management 1 **Project proposal (D&C) due**
4	Engineering management 2, managing research & development 1 **Group meeting 1 - Project proposal (D&C)** **Project proposal (D&C) revision due**
5	Managing research & development 2 **Bootcamp evening lecture - attendance mandatory (date TBD)**
6	Engineering economics 1 & 2, ethics
7	End of semester lecture, design and testing, quizzes for double major (PSE and ECE degrees) students
8	**Midterm demo - CREOL lobby**
9	Design calculations
10	Design calculations, engineering specifications of components for component selection
11	Engineering specifications of components for component selection, engineering requirements specification for the system performance **Midterm milestone report (60-page) due**
12	Engineering requirements specification for the system performance **Group meeting 2 - Midterm milestone report** **MIdterm milestone report (60-page) revision due**
13	Design constraints & standards
14	Work on final report, design constraints & standards
15	**Final demo - CREOL lobby**
16	Final exam week (no final exam) **Mini-demo video due** **Final report (120-page) due**

Course Notes

Project Topics: Projects can be in any area of Photonic Science and Engineering but must also have elements that are suitable for members of the group who are electrical and/or computer engineers. Projects are subject to instructor's approval. The instructor may propose some projects. However, it is the student's responsibility

to find a suitable project. All projects must be physically realized, documented, and demonstrated by the end of the semester.

Project Teams: Each project will be designed and implemented by a project team or group with a size restricted to only groups of three or four students. The instructor may assist in the formation of the teams, but you are encouraged to form your own working teams. If necessary, the instructor may dictate the group members. Photonics students are expected to team with electrical and/or computer engineering students. A typical team would have three or four students, comprising one or two Photonics students, one electrical and one computer engineering student.

Expenses: The university will not provide project parts beyond what is available in school laboratories. The cost of the project may be exclusively yours, exclusively your sponsor's, or may be shared. The most common case is that the project is funded by the student group, or by a sponsoring group, agency or corporation.

NOTE: If project expenses are paid in part or in whole by UCF, then the project becomes the property of the school and it must remain at UCF.

CREOL Purchasing Office: If your Senior Design project has received grants to cover the expenses partially or fully, you should utilize the CREOL Purchasing Office to buy components for your project instead of incurring out-of-pocket expenses. There have been some changes to the reimbursement process. To start, orders should be placed through creol-purchasing@creol.ucf.edu whenever possible. CREOL has accounts with Amazon (Prime), Fisher Scientific, Thorlabs, and many other frequently used vendors. Going through CREOL will make sure that you get the appropriate discounts and tax exemption. In the event, you do need to make an emergency purchase and get reimbursed, here is what you need to do:

1. Send an email to creol-purchasing@creol.ucf.edu detailing what was purchased, why it had to be done as a reimbursement, and provide an account number to charge. Attach copies of your receipts/invoices to the email. They must show what was bought, amounts, and confirm payment was made – an order acknowledgement will not be accepted.
2. Do not stockpile receipts/invoices over many weeks and months. To avoid accounting issues, the receipts/invoices should be submitted to Matt Petrone

(creol-purchasing@creol.ucf.edu) as soon as possible. Reimbursements that exceed 60 days could be considered as taxable income or may be ineligible for reimbursement.

3. If you need to make an out-of-pocket purchase more than $500, check with Matt Petrone (creol-purchasing@creol.ucf.edu) first.

Reimbursements up to $250 will be paid out in cash; Tavis McLelland will contact you when it's ready for pickup. Reimbursements that are more than $250 will be processed through Accounting and be direct-deposited into your bank account. The turn-around is usually 1-2 months, depending on the volume of reimbursements. Do not make out-of-pocket purchases if two months without the money will cause you financial hardship.

If you have any questions, please feel free to reach out to creol-purchasing@creol.ucf.edu, or Mark Wagenhauser at markw@creol.ucf.edu.

Laboratory: No formal laboratory work is required. However, virtually all projects require hardware prototyping which will include construction and testing. Laboratory space and facilities will be available for this purpose.

To protect project installations, only students that are registered in the class will be allowed in the lab. You can work in the EECS senior design laboratories during non-business hours and on weekends by using your college keycards, and if needed requesting entry to the engineering building from the UCF Police Department. Identification will be required. Due to the policy stated below, the police will not provide entry to a single student. A minimum of two students are required when working in the laboratory. Permission to use the Photonics senior design lab can be obtained through Mr. Michael McKee.

Safety: University policy requires that for safety reasons, at least two people must be present in the laboratory premises at any time. Violators will be asked to leave the laboratory premises. Since it is not possible to police this policy at all the times, violators will be working entirely at their own risk.

Consultations: Consulting on each project will be available either from the course instructor or from any other Optics or ECE Department faculty member who has expertise on the topics of your project. Each team is encouraged to find a faculty

member who will act as a technical advisor for the project. Appointments should be made for consultation times.

Final Documentation: The required final documentation consists of a formal technical document consisting of research, design, theory of operation, construction and testing.

Important: Final reports for photonics projects MUST contain a section at the end which contains results of testing of the optical setup built in the SD1 semester. Where appropriate, this section should describe any explanation of why specifications or constraints were not met.

Deadlines

The deadlines for a few selected topics are presented in the table below. The deadlines for other project activities (e.g., report submission, presentation, project review meetings, Boot camp (mandatory attendance)) will be announced during the semester.

Topic	Deadline
Academic activity verification	Students' academic activity is required by UCF to be recorded at the beginning of each course. The assignment to complete the academic activity verification is that you upload a pdf file to the OSE 4951 webcourse Assignments Section on or before Friday in the first week of classes. The pdf file should contain your name and a written description of an idea about your senior design project. Failure to do so may result in a delay in the disbursement of your financial aid.
Midterm Demo	March 3, Tuesday (9 AM – 11:30 AM, CREOL Lobby): Display a midterm demo in-person to show that a subset of your optical design works. The project must be set up before 9 AM to be ready for the demo at 9 AM. Failure to do so may result in one letter grade deduction from the Final Grade of each photonics student in a group.

Final Demo	April 21, Tuesday (9 AM – 11:30 AM, CREOL Lobby): Display a demo in-person to show that a subset of your optical design works. The project must be set up before 9 AM to be ready for the demo at 9 AM. Failure to do so may result in one letter grade deduction from the Final Grade of each photonics student in a group.