All Fields Report

Basic Course Information

College	Cañada College
Discipline	PALT-Photonics and Laser Technology
Course Number	401
Full Course Title	Introduction to Photonics and Laser Technology
Catalog Course Description	An introductory review of photonics and laser technology (PALT) and the mathematical skills to address engineering problems in PALT. Topics include: Review of various PALT quantities, common PALT algebraic expressions, visualization of typical linear and non-linear behaviors in PALT, geometry and trigonometry in PALT elements like lenses and prisms, description of sinusoidal and wave motion, introduction to concepts like polarization through complex notation and vectors.
Class Schedule Course Description	An introductory review of photonics and laser technology (PALT) and the mathematical skills to address engineering problems in PALT. Topics include: Review of various PALT quantities, common PALT algebraic expressions, visualization of typical linear and non-linear behaviors in PALT, geometry and trigonometry in PALT elements like lenses and prisms, description of sinusoidal and wave motion, introduction to concepts like polarization through complex notation and vectors.

Proposal Information

Proposed Start	Year: 2021 Semester: Fall
Proposed Curriculum Committee Meeting Date:	01/22/2021
Deadline for submission to Dean's Queue:	12/17/2020
Deadline for submission of curriculum proposal to the Technical Review Committee:	12/29/2020
Proposal Origination Date:	10/13/2020
Justification For Board Report OR Curriculum Inventory update:	1. For NEW Courses: Provide a brief justification statement describing the need for the course, its place in the curriculum, and pertinent information such as the role of advisory committees. New courses require approval of the SMCCCD Board of Trustees. The justification statement will be included on the annual Curricular Board report. Use complete sentences and present tense. 2. For all types of Course MODIFICATIONS (modifications, banking, deletions and reactivations): Provide a brief justification statement describing the need for the change. The justification statement will be used for course updates in the State Curriculum Inventory as necessary. Use complete sentences and present tense. The course content is recommended by the Advisory Board and provides the student with foundational skills to solve numerical problems in optical, photonics and laser technology. This course is a core requirement for the Certificate of Achievements in Photonics and Laser Technology and in Advanced Photonics and Laser Technology.
Honors Course	No
Open Entry/Open Exit	No 0

Equivalent Courses

Will this course replace an	No

existing course in the catalog, or an experimental course?	
If yes, identify and explain.	

Similar Courses

Is there a similar or equivalent course in SMCCCD?	No
Added Similar Courses	

Units/Hours

Unit Types	Fixed
Units	Min: 2.00
Variable Range	Range (or)

Hours

Please enter hours as per term values

Method	Min Hours	Max Hours	Min Faculty Load	Min Units
Lecture	32.00	36.00	0.00	2.00
Lab	0.00	0.00	0.00	0.00
TBA	0.00	0.00	0.00	0.00
Work Experience	0.00	0.00	0.00	0.00
Field Experience	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00
Homework	64.00	72.00	0.00	0.00
Other Hours				

Course Details

Repeatable for Credit	No
Grading Methods	Pass/No Pass Only
Audit	Yes

Materials Fee

Fee Required?	No

Student Learning Outcomes

Upon successful completion of this course, a student will meet the following outcomes:
1. Identify and convert between common PALT quantities through proper use of units and dimensions.
2. Simplify or reorganize algebraic expressions involving PALT quantities.
3. Simplify problems involving powers, roots, exponents and logs.
4. Read, interpret and draw graphs and plots from given data using spreadsheets
5. Find unknown angles ray tracing through triangular geometry and trigonometry.
6. Calculate wave properties like frequency, period and amplitute.
7. Convert complex numbers between rectangular and polar forms and perform mathematical operations with complex numbers

Course Objectives

Upon successful completion of this course, a student will be able to:
1. Understand the relation between various optical quantities based on their units and dimensions.
2. Learn to work with common formulas in PALT involving various quantities
3. Explore the relationships between various PALT quantities through linear as well as non-linear functional forms, like exponents, logarithm, and power laws.
4. Learn to apply ray tracing principle using geometrical properties of triangles and trigonometric relationships.
5. Learn to read graphs and plots
6. Learn to enter data into a spreadsheet and generate plots using that data
7. Understand how to interpret sinusoidal and other wave motion based on the features like periodicity, phase and amplitude.
8. Work with complex numbers in rectangular and polar coordinates.
9. Work with vector notations.

Course Lecture Content

1. Scientific quantitites in PALT

     a. Basic scientific notations

2. Converting between optical quantities

     a. Useful math operations

     b. Units and dimensions

     c. Ratio and proportion

     d. Dimensional Analysis

3. Formulas in PALT

     a. Algebraic expressions

     b. Rearranging formulas

     c. Solving for unknowns

4. Linear and non-linear behaviors

     a. Powers, Exponents and Logs

     b. Equations with powers and roots

5. Trigonometry and Geometry in PALT

     a. Converting between angular units

     b. Angles in optical systems

     c. Trignometric functions

6. Visualization in PALT

     a. Geometrical techniques

b. Graphing

c. Periodic and non-periodic functions

d. Use of spreadsheets to create data and visualization

7. Waves in PALT

a. Sinusoidal motion

b. Complex quantities

c. Wave addition

8. Vectors in PALT

a. Ray tracing

b. Polarization

Course Lab Content

TBA Hours Content

Frequently Recommended Preparation

Frequently Recommended	Eligibility for READ 836 and ENGL 836; or ENGL 847 or ESL 400.
	Writing
	1. Write complete sentences and unified paragraphs.
	2. Use correct basic punctuation, grammar and syntax.
	Reading
	1. Read material at 9th grade level accurately and with good comprehension.
	2. Determine word meanings of vocabulary used in material at this level.
	Eligibility for MATH 110.
	1. Use the whole number system and perform arithmetic computations.
	2. Perform division, multiplication, addition and subtraction of fractions.
	3. Solve problems involving ratio, proportion, and percent.

Justification for Frequently Recommended Preparation

Why is the knowledge of the recommended course(s), skill(s) or information necessary for students to succeed in the "target" course? Specify the relationship between the recommended knowledge and skills required of students and those taught in the "target course? (Please list the specific proficiencies students must possess in order to succeed in the "target" course.)

"Students will be required to read and comprehend vocabulary and abstract ideas at the 9th grade level or higher. Course

reading includes textbooks as well as articles discussing research and issues in photonics and laser technology. Finally, working with principles and engineering applications in photonics and laser technology, students must perform basic arithmetic computations and comparisons, including solving problems involving ratio, proportion, and percent."

Other Recommended Preparation

You have no defined requisites.

Prerequisites/Corequisites

You have no defined requisites.

Content Review

You have not defined content review.

Mode of Delivery

Modes of Delivery

Online
Hybrid
Lecture

Representative Instructional Methods

Methods	Lecture Discussion Guest Speakers Other (Specify)
Other Methods	The course will be supplemented by technology and by video and/or Web-based content as appropriate.

Representative Assignments

Writing Assignments
(List all assignments, including library assignments. Outside assignments are not required for lab-only courses, although they can be given.)

- Weekly submission of strategies, modeling, analysis, and/or results of numerical problems in PALT (1-3 pages in length).

Reading Assignments
(List all assignments, including library assignments. Outside assignments are not required for lab-only courses, although they can be given.)

- Course textbook(s) (40 - 50 pages per week)

- Internet resources (40 - 50 pages per semester)

Other Outside Assignments
(List all assignments, including library assignments. Outside assignments are not required for lab-only courses, although they can be given.)

- Out of class assignments will be in keeping with the goals and objectives of the course. The use of critical thinking is required for the students to apply the principles of optics to optical technology. Students are expected to complete a minimum of two hours of outside assignments for each hour of classroom lecture.

To be Arranged Assignments **(List all assignments, including library assignments. Outside assignments are not required for lab-only courses, although they can be given.)**

- Not applicable

Representative Methods of Evaluation

This section defines the ways students will demonstrate that they have met the student learning outcomes.

Student grades will be based on multiple measures of student performance. Instructors will develop appropriate classroom assessment methods and procedures for calculating student grades, including the final semester grade. The following list displays typical assessment methods appropriate for this course. The actual assessment methods used in a particular classroom and section will be listed in the instructor?s syllabus.

Methods must effectively evaluate critical thinking. Credit courses must include written communication, problem solving, and/or skills demonstrations.

Multiple measures may include, but are not limited to, the following:

Methods	- Class Participation - Class Performance - Exams/Tests - Homework - Quizzes - Written examination

Representative Texts

Textbooks such as the following are appropriate:

Formatting Style	APA

Textbooks	
	1. University of Central Florida. *Essential Mathematics for Engineering Technicians*, ed. Op-Tec, University of Central Florida, 2015
	2. Hecht, E.. *Optics*, 5 ed. Pearson, 2016
	3. M. Mansuripur. *Mathematical Methods in Science and Engineering (Applications in Optics and Photonics)*, 1 ed. San Diego: Cognella Academic Publishing, 2018

Manuals	
You have no manuals defined.	

Periodicals	
You have no periodicals defined.	

Software	

You have no software defined.

Other	
	You have no other defined.

Degree/Certificate Applicability

Designation	Degree Credit
Proposed For	Certificate/Skill Award
Course Designation Text	Are there degrees/certificates to which this course applies? 1. CA in Photonics and Laser Technology 2. CA in Advanced Photonics and Laser Technology

General Education/Degree/Transfer Course

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By Jose Pena

CSU Transfer Course	
	Transfers to CSU Approved

Course Distance Education

Distance Ed Supplement	New distance education supplement
Distance Education	Distance education component was developed by an instructor with training in online pedagogy. Training: QOTL or equivalent Course at Canada College
Method of Distance Education	Online, Hybrid, Web Assisted Course; (If there are limitations on how this course would be offered please explain below)
Online Method Limitations	
Other Methods	
Course Content and Methodology	The objectives and content of the course are adequately covered by the methods of instruction, assignments, evaluation of student outcomes, and instructional materials. If this course is currently taught in a lecture mode, the department faculty have determined that the same objectives can be achieved in a distance learning mode. The instructional equipment and materials are sufficient. The preparation and training of faculty are sufficient. Methods of student evaluation are designed to maintain examination security. Evaluation of student outcomes is sufficient to permit review and assessment of the effectiveness of distance education for this course and to provide information for the annual distance education report.
Instructional Methodologies (How will you deliver the course content?):	Announcements/Bulletin Boards Chat Rooms E-mail One-Way Video Conferencing (One-way interactive video and two-way interactive audio) Online Presentations Resource Links Two-Way Video conferencing (Two-way interactive video and audio)
Representative Courseware/Textbooks Materials:	Possible textbooks include: University of Central Florida. Essential Mathematics for Engineering Technicians, ed.Op-Tec, University of Central Florida, 2015 Hecht, E.. Optics, 5 ed.Pearson, 2016 M. Mansuripur. Mathematical Methods in Science and

	Engineering (Applications in Optics and Photonics), 1 ed.San Diego:Cognella Academic Publishing, 2018
Methods of Evaluation of Student Performance:	Weekly Homework submitted electronically Weekly Quiz submitted electronically Monthly test or exam conducted electronically
How are you ensuring that students with disabilities can access your course in accordance with Section 508?	Students will have access to all material on-line or for download to use offline - All video lessons also have caption/subtitle - All video lessons also have associated printable files.

Plan for Regular Effective Communication Contact Between Faculty and Student (Title 5, 55204). "Local policies should establish and monitor minimum standards of regular effective contact."

Announcements/Bulletin Boards - At least twice a week course related information will be sent to students.
Email Communication - Response by email within 24-48 hours
Office hours - Weekly office hours held via video or phone call

Resources Needed

Adequate Library Resources	Consultation with the Coordinator of Library Services regarding the adequacy of campus and online information resources to fulfill course objectives is required prior to course approval. Inadequate to support the course Please Specify:
Affected Resources	Which of the following resources do you expect to be affected by the offering of this class? Check as many as appropriate. None of the above
Explain what effect the areas you have checked will have upon this college:	

Comparable Transfer Course Information

Are there comparable courses?	Yes
Edit/Del	College Info

Minimum Qualification

No Minimum Qualifications For this Course

CB Codes

CB03 TOP Code	0934.80 - Laser and Optical Technol
CB04 Course Credit Status	D - Credit - Degree Applicable
CB05 Course Transfer Status	B = Transferable to CSU only
CB08 Course Basic Skill Status (PBS Status)	2N = Course is not a basic skills course.
CB09 SAM Code	D - Possible Occupational

CB11 California Classification Codes	Y - Credit Course
CB21 Levels Below Transfer	Y = Not Applicable
CB23 Funding Agency Category	A = Fully Economic Development funds
CB25 Course General Education Status	Y - Not Applicable
CB26 Course Support Course Status	N - Course is not a support course

Codes/Dates

Entry of Special Dates

Instruction Office Review	01/22/2021
Last Outline Revision	
Content Review	
CC Approval	01/22/2021
DE Approval	01/22/2021
Effective Term	Term: Fall Year: 2021

Web Catalog

Course Family	
Web Catalog	☐ Exclude from Web Catalog

Instructional Services

Implementation Date	

Originator	Ramki Kalyanaraman
Origination Date	10/13/2020
Proposal Type	Cañada New Course
C-ID Numbers	
CB00 State ID	
CB03 TOP Code	0934.80 - Laser and Optical Technol
CB04 Course Credit Status	D - Credit - Degree Applicable
CB05 Course Transfer Status	B = Transferable to CSU only
CB08 Course Basic Skill Status (PBS Status)	2N = Course is not a basic skills course.
CB09 SAM Code	D - Possible Occupational
CB10 Course COOP Work Exp-ED	N = Not part of Coop Work Exp
CB11 California Classification Codes	Y - Credit Course
CB13-Special Class Status	N - Not Special
CB21 Levels Below Transfer	Y = Not Applicable
CB22 Non Credit Course Category	Y - Not Applicable
CB23 Funding Agency Category	A = Fully Economic Development funds
CB24-Program Course Status	1 = Program Applicable

CB25 Course General Education Status	Y - Not Applicable
CB26 Course Support Course Status	N - Course is not a support course

Web Catalog Metadata