

All Fields Report

Basic Course Information	
College	Cañada College
Discipline	PALT-Photonics and Laser Technology
Course Number	408
Full Course Title	Optical Fibers
Catalog Course Description	An introductory hands-on course in optical fiber technology describing the transmission of light through optical fibers. Topics Include: principles of light transmission in optical fibers; fiber optic fundamentals; fiber technology; applications of fiber optics; experiments with light behavior through fibers.
Class Schedule Course Description	An introductory hands-on course in optical fiber technology describing the transmission of light through optical fibers. Topics Include: principles of light transmission in optical fibers; fiber optic fundamentals; fiber technology; applications of fiber optics; experiments with light behavior through fibers.
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:	<p>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.</p> <p>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.</p> <p>The course content is recommended by the Advisory Board. It provides students with the necessary hands-on skills to safely connect and use fiber optic cables and systems. This course is a core requirement for the Certificate of Achievement in Advanced Photonics and Laser Technology.</p>
Honors Course	No
Open Entry/Open Exit	No 0

Equivalent Courses	
Will this course replace an existing course in the catalog, or an experimental course?	No
If yes, identify and explain.	

Similar Courses

Is there a similar or equivalent course in SMCCCD?	Yes
Added Similar Courses	NETX 411 (Skyline College)

Units/Hours

Unit Types	Fixed
Units	Min: 3.00
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	2.00	2.00
Lab	48.00	54.00	2.40	1.00
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	
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Course Details

Repeatable for Credit	No
Grading Methods	Letter Grade Only
Audit	Yes

Materials Fee

Fee Required?	No
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Student Learning Outcomes

Upon successful completion of this course, a student will meet the following outcomes:
1. Demonstrate the principles of optical fiber technology by solving analytical and numerical problems involving various types of fibers and light characteristics.
2. Demonstrate ability to measure the characteristics of optical fibers.
3. Show the ability to work in teams to gather and analyze data and prepare technical reports describing experimental work.
4. Work independently to prepare and deliver presentations of their laboratory findings through use of presentation software (like libreoffice impress or powerpoint).

Course Objectives

Upon successful completion of this course, a student will be able to:
1. Describe light transmission through fibers and wave guides.
2. Describe characteristics of lights before, within and after interaction with fibers.
3. Describe different types of fiber technologies.

4. Perform experiments using fiber optic material.
5. Perform experiments involving fiber slicing and fiber alignment.
6. Perform analysis of fiber characteristics.

Course Lecture Content

1. Application of optical fibers
 1. Light guiding
 2. Communications
 3. Flexible lighting
 4. Fiber lasers
2. Light transmission in optical fibers
 1. Light guiding
 2. Critical angle and total internal reflection
 3. Propagation and Loss
3. Light frequency and power in fibers
 1. Core and Cladding
 2. Decibels in fiber optic circuits
4. Principles of fiber optics
 1. NA, Modes
 2. Single mode fibers
 3. Large mode area fibers
 4. Polarization maintaining fibers
5. Fiber manufacturing
 1. Fiber Splicing
 2. Fiber-coupling
6. Doped fibers
 1. Fiber Components
 2. WDM, splitter,
 3. Circulator, isolators
 4. AOMs
 5. Fiber Bragg Gratings
7. Fiber Laser Architectures
 1. CW
 2. Q-switched
 3. Modelocked
8. Losses in Optical Fibers
 1. Absorption
 2. Scattering
 3. Fresnel reflection
 4. Bending losses
9. Dispersion in optical fibers
 1. Intermodal dispersion
 2. Graded index fiber
 3. Intramodal dispersion

Course Lab Content

1. Connecting optical Fibers
 1. Overcoming alignment challenges
 2. Lateral misalignment
 3. Core alignment
 4. Angular misalignment

- 5. Gap loss measurements
- 6. Stripping
- 7. Cleaning
- 8. Cleaving
- 2. Fusion Splicing
 - 1. Fiber preparation
 - 2. Protecting the fiber during splicing
 - 3. Holding and moving fibers in the splicer
- 3. Mechanical Splicing
 - 1. Vee-grove approach
 - 2. Bent tube approach
 - 3. Precision tube approach
- 4. Fiber-to-fiber coupling using bulk optics
 - 1. Single mode to multimode fiber coupling
 - 2. Characterization of mode profile vs bend radius
- 5. Testing a fiber optic system
 - 1. Visible light continuity test
 - 2. Power meter measurements
 - 3. Calibration of system
- 6. Optical time domain reflectometer (OTDR)
 - 1. Measure distance
 - 2. Find the speed of light
- 7. Constructing a fiber laser
 - 1. Build a cw fiber laser using single mode Yb fiber, Fiber Bragg grating and 980 nm pump diode

TBA Hours Content

Frequently Recommended Preparation	
Frequently Recommended	
Justification for Frequently Recommended Preparation	
<p>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.)</p>	
Other Recommended Preparation	
<i>You have no defined requisites.</i>	

Prerequisites/Corequisites		
Drag and Drop to Reorder		
Edit/Delete	Requisites	Analysis
	Prerequisite PALT 405	

Content Review
PALT 405 - Prerequisite (Objective to Objective) *Launched*

Mode of Delivery

Modes of Delivery

Hybrid
Lecture
Lab

Representative Instructional Methods

Methods

Lecture
Lab
Experiments
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.)

1. Weekly report of design, modeling and analysis of fiber optical systems (1-3 pages in length).
2. Weekly Laboratory report (5-10 pages) for each laboratory experiment summarizing objectives, procedures, results and conclusions.
3. Monthly formal laboratory report (10-20 pages) following engineering technical writing guidelines.

Reading Assignments

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

1. Weekly textbook readings (50 pages).
2. Monthly Reading of laboratory handouts (20-50 pages)
3. Monthly Reading of technical articles on optical fiber technology topics (2-6 pages)

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 fiber optics systems. 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

- Exams/Tests
- Homework
- Lab Activities
- Oral Presentation
- Quizzes
- Written examination

Representative Texts

Textbooks such as the following are appropriate:

Formatting Style

APA

Textbooks

1. Crisp, J., Elliott, B. *Introduction to Fiber Optics*, ed. Elsevier, 2005
2. Tarun Kumar Gangopadhyay, Pathik Kumbhakar, Mrinal Kanti Mandal. *Photonics and Fiber Optics: Foundations and Applications*, 1 ed. CRC Press, 2019

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? CA in Advanced Photonics and Laser Technology

General Education/Degree/Transfer Course

Page Last Saved on Friday, Oct 30, 2020 at 7:00 PM

By Ramki Kalyanaraman

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	Students a be required to come to campus to access lab facilities.
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.
Instructional Methodologies (How will you deliver the course content?):	Announcements/Bulletin Boards 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: Tarun Kumar Gangopadhyay, Pathik Kumbhakar, Mrinal Kanti Mandal. Photonics and Fiber Optics: Foundations and Applications, 1 ed.CRC Press, 2019 Crisp, J., Elliott, B. Introduction to Fiber Optics, ed.Elsevier, 2005
Methods of Evaluation of Student Performance:	Multiple types of formative and summative assessments will be used 1. Bi-weekly assessment of laboratory reports that will be submitted online 2. Weekly assessment of homework assignments that will be submitted online
How are you ensuring that students with disabilities can access your course in accordance with Section 508?	Instructional materials have been tagged to indicate organizational structure and reading order. Images, tables and/or diagrams include textual representations. If applicable, the instructor will ask the publisher or content provider to provide a Voluntary Product Accessibility Template (VPAT) which evaluates how accessible the product is according to section 508 standards.

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 - Communication will occur at least two times a week. This will include course content as well as information on homework, labs, quizzes and tests. In addition, STEM related opportunities will also be announced at least once a month.

Email Communication - Response by email within 24-48 hours

Office hours - Weekly office hours held via video or phone call

Other (explain) - One ore more lesson content will be delivered each week by the online learning management platform

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. New equipment needs
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	B - Advance 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	N - Course is not a support course

Course Status

Codes/Dates

Entry of Special Dates

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

Web Catalog

Course Family	
Web Catalog	<input type="checkbox"/> 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	B - Advance 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