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| Description: logo | **ÇANKAYA UNIVERSITY**  **Faculty of Engineering** Course Definition Form |

This form should be used for either an elective or a compulsory course being proposed and curricula development processes for an undergraduate curriculum at Çankaya University, Faculty of Engineering. Please fill in the form completely and submit the printed copy containing the approval of the Department Chair to the Dean's Office, and mail its electronic copy to [dozgor@cankaya.edu.tr](mailto:dozgor@cankaya.edu.tr). Upon the receipt of *both copies*, the printed copy will be forwarded to the Faculty Academic Board for approval. Incomplete forms will be returned to the Department. The approved form is finally sent to the President’s office for approval by the Senate.

**Part I. Basic Course Information**

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| **Department Name** | ELECTRONIC AND COMMUNICATION ENGINEERING | | | | **Dept. Numeric Code** | | |  |  | | --- | --- | | 1 | 4 | |
| **Course Code** | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | E | C | E | 4 | 7 | 4 |  | | **Number of Weekly Lecture Hours** | |  | | --- | | 3 | | **Number of Weekly Lab/Tutorial Hours** | |  | | --- | | 2 | | **Number of Credit Hours** | |  | | --- | | 4 | |
| **Course Web Site** | http://ece474.cankaya.edu.tr/ | | | | **ECTS Credit** | | |  |  | | --- | --- | | 0 | 7 | |

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| **Course Name**  *This information will appear in the printed catalogs and on the web online catalog.* | |
| English Name | Optical Communication Systems + Laboratory |
| Turkish Name | Optik Haberleşme Sistemleri + Laboratuvar |

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| **Course Description**  *Provide a brief overview of what is covered during the semester. This information will appear in the printed catalogs and on the web online catalog.*  *Maximum 60 words.* |
| Light wave propagation in fibers, attenuation and dispersion in fibers. The principles of light generation, semiconductor laser and led structure, photodetectors, free space optics propagation and ABCD system |

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| **Prerequisites**  (if any)  *Give course codes and check all that are applicable.* | 1st   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | 2nd   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | | | 3rd   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | | 4th   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | |
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| Consent of the Instructor | | | Senior Standing | Give others, if any. | | |
| **Co-requisites**  (if any) | 1st   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | 2nd   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | | | 3rd   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | 4th   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | |
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| **Course Type**  *Check all that are applicable* | Must course for dept.  Must course for other dept.(s)  Elective course for dept.  Elective course for other dept.(s) | | | | | | |

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| **Course Classification**  *Give the appropriate percentages for each category.* | | | | | |
| Category | Mathematics & Natural Sciences | Engineering Sciences | Engineering Design | General Education | Other |
| Percentage | 20 | 40 | 40 | 0 | 0 |

**Part II. Detailed Course Information**

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| **Course Objectives**  *Explain the aims of the course. Maximum 100 words.* |
| 1. Get acquainted with the concept of light propagation in fibres. 2. Become familiar with light propagation in atmosphere. |

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| **Learning Outcomes**  *Explain the learning outcomes of the course. Maximum 10 items.* |
| 1. Understand the basic principles of light propagation, dispersion and attenuation in fibres. 2. Learn about light sources and photodetectors. 3. Have an idea about light propagation through atmosphere. |

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| **Textbook**(s)  *List the textbook(s), if any, and other related main course materials.* | | | | |
| Author(s) | Title | Publisher | Publication Year | ISBN |
| Gerd Keiser | Optical Fiber Communications | McGraw Hill | 2000 | 0-07-116468-5 |

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| **Reference Book**s  *List the reference books as supplementary materials, if any.* | | | | |
| Author(s) | Title | Publisher | Publication Year | ISBN |
| Govind P. Agrawal | Fiber-Optic Communication Systems | Jon Wiley and Sons | 2002 | 0-471-21571-6 |
| B. E. A. Saleh, M.C. Teich | Fundamentals of Photonics | Jon Wiley and Sons | 2007 | 978-0-471-35832-9 |

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| **Teaching Policy**  *Explain how you will organize the course (lectures, laboratories, tutorials, studio work, seminars, etc.)* |
| 3 hours of lecturing and 2 hour of laboratory per week |

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| **Laboratory/Studio Work**  *Give the number of laboratory/studio hours required per week, if any, to do supervised laboratory/studio work, and list the names of the laboratories/studios in which these sessions will be conducted.* |
| Fibre optic experiments and MATLAB experiment for propagation in atmosphere. |

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| **Computer Usage**  *Briefly describe the computer usage and the hardware/software requirements in the course.* |
| Computer usage is not required except MATLAB experiment |

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| **Course Outline**  *List the topics covered within each week.* | |
| Week | Topic(s) |
| 1 | Light wave propagation in fibers |
| 2 | Mode theory based on Maxwell equations |
| 3 | Mode theory based on Maxwell equations |
| 4 | Attenuation and dispersion in fibers |
| 5 | Dispersion analysis in single mode and multi mode fibres |
| 6 | The principles of light generation, semiconductor laser and LED structure |
| 7 | Midterm exam + LEDs |
| 8 | Laser and LED emission |
| 9 | Photodetectors (PIN, APD) |
| 10 | Free space optics propagation |
| 11 | Gaussian beam, paraxial approximation |
| 12 | Input, output beam parameters |
| 13 | ABCD matrix representation |
| 14 | Review and problem solving |

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| **Grading Policy**  *List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.* | | | | | | | | |
| Assessment Tool | Quantity | Percentage | Assessment Tool | Quantity | Percentage | Assessment Tool | Quantity | Percentage |
| Homework | 6 | Bonus | Case Study |  |  | Attendance | 2 (Lec. + Lab) | 10% |
| Quiz |  |  | Lab Work | 26 hours | 20% | Field Study |  |  |
| Midterm Exam | 1 | 30% | Class Participation | 39 hours | Bonus |  |  |  |
| Term Paper |  |  | Oral Presentation |  |  |  |  |  |
| Project |  |  | Final Exam | 1 | 40% |  |  |  |

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| **ECTS Workload**  *List all the activities considered under the ECTS.* | | | |
| Activity | Quantity | Duration  (hours) | Total Workload  (hours) |
| Attending Lectures (*weekly basis*) | 14 | 3 | 42 |
| Attending Labs/Recitations (*weekly basis*) | 14 | 2 | 28 |
| Preparation beforehand and finalizing of notes (*weekly basis*) | 14 | 2 | 28 |
| Collection and selection of relevant material (*once*) | 1 | 3 | 3 |
| Self-study of relevant material (*weekly basis*) | 14 | 2 | 28 |
| Homework assignments | 6 | 2 | 12 |
| Preparation for Quizzes | 0 |  | 0 |
| Preparation for Midterm Exams (*including the duration of the exams*) | 1 | 8 | 8 |
| Preparation of Term Paper/Case Study Report (*including oral presentation*) | 0 |  | 0 |
| Preparation of Term Project/Field Study Report (*including oral presentation*) | 0 |  | 0 |
| Preparation for Final Exam (*including the duration of the exam*) | 1 | 12 | 12 |
| TOTAL WORKLOAD **/** 25 | | | 6,84 |
| **ECTS Credit** | | | **7** |

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| **Program Qualifications vs. Learning Outcomes**  *Consider the below program qualifications determined in terms of learning outcomes of all the courses in the curriculum and capabilities. Look at the learning outcomes of this course given above. Relate these two using the Likert Scale by marking with X in one of the five choices at the right.* | | | | | | |
| **No** | **Program Qualifications** | **Contribution** | | | | |
| **0** | **1** | **2** | **3** | **4** |
| ECE-01 | Adequate knowledge in mathematics, science and engineering subjects pertaining to Electronics and Communication Engineering; Engineering; ability to use theoretical and applied information in these areas to model and solve Electronics and Communication Engineering problems. |  |  |  |  | **X** |
| ECE-02 | Ability to identify and define complex Electronics and Communication Engineering problems; ability to select and apply proper analysis tools and methods and modeling techniques for formulating and solving such problems. |  |  |  | **X** |  |
| ECE-03 | Ability to analyze a complex system and/or a subsystem or a process and ability to design it under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern systems design methods for this purpose. |  | **X** |  |  |  |
| ECE-04 | Ability to devise, select, and use modern techniques and computing tools needed for Electronics and Communication Engineering practice; ability to employ and make use of information technologies effectively with the knowledge of state-of-the art hardware but mostly software capabilities related to Electronics and Communication Engineering. |  | **X** |  |  |  |
| ECE-05 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems in general and for systems analysis, design, implementation and continuous improvement from Electronics and Communication Engineering perspective in particular. |  |  | **X** |  |  |
| ECE-06 | Ability to search data bases and other information resources effectively; ability to identify and extract the required information and required information from literature and other open sources. |  | **X** |  |  |  |
| ECE-07 | Ability to work individually, to take independent initiatives, to create original inferences and to work in teams efficiently; ability to collaborate effectively in intra-disciplinary and multi-disciplinary teams; ability to take responsibility within teams. |  |  | **X** |  |  |
| ECE-08 | Ability to communicate effectively in Turkish, both orally and in writing and knowledge of a minimum of one foreign language (English in particular)at a fluency level enough to follow easily Electronics and Communication Engineering knowledge presented in that language and enough to communicate effectively with colleagues. |  |  | **X** |  |  |
| ECE-09 | Ability to report findings, conclusion and interpretations related to a project, ability to write technical reports, to prepare and conduct effective presentations. |  |  |  | **X** |  |
| ECE-10 | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to keep continuous self-improvement. |  |  | **X** |  |  |
| ECE-11 | Awareness of professional and ethical responsibility issues and their legal consequences. | **X** |  |  |  |  |
| ECE-12 | Awareness of environmental issues, occupational safety and health, and their legal consequences. | **X** |  |  |  |  |
| ECE-13 | Knowledge about contemporary issues and the global and social effects of engineering practices; awareness of the legal consequences of engineering solutions; awareness of entrepreneurship, innovation, and sustainable development | **X** |  |  |  |  |

Contribution Scale to a Qualification: **0**-None, **1**-Little, **2**-Medium, **3**-Considerable, **4**-Largest

**Part III New Course Proposal Information**

*State only if it is a new course*

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| Is the new course **replacing** a former course in the curriculum**?** | | | | Yes | No | Former Course’s Code   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | | | | Former Course’s Name | |
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| Is there any similar course which has content **overlap** with other courses offered by the university**?** | | | | Yes | No | Most Similar Course’s Code   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | | | | Most Similar Course’s Name | |
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| **Frequency** of Offerings  *Check all semesters that the course is planned to be offered.* | | | | Fall  Spring  Summer | | | | | | | |
| **First** Offering | Academic Year | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 2 | 0 | 0 | 4 | / | 2 | 0 | 0 | 5 | | | | | Semester | | Fall  Spring | | |
| Maximum **Class Size** Proposed | | |  | | --- | | 40 | | Student **Quota** for Other Departments | | | | |  | | --- | | 0 | | Approximate **Number of Students** Expected to Take the Course | | | |  | | --- | | 40 | |
| **Justification for the proposal**  *Maximum 80 words* | | | | | | | | | | | |
| It is essential that student gain the basic concepts of opticall communications techniques, both in guided medium such as optical fibres and in free space atmosphere. | | | | | | | | | | | |

**Part IV Approval**

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| **Proposed by** | Faculty Member  *Give the Academic Title first.* | Signature | Date |
| Prof. Dr. Halil Tanyer EYYUBOĞLU |  |  |
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| Departmental Board Meeting Date |  | Meeting Number |  | Decision Number |  |
| Department Chair | Dr. Öğr. Üyesi Özgür ERGÜL | Signature |  | Date |  |

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| Faculty Academic Board Meeting Date |  | Meeting Number |  | Decision Number |  |
| Dean | Prof. Dr. S. Kemal İDER | Signature |  | Date |  |

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| Senate  Meeting Date |  | Meeting Number |  | Decision Number |  |