# AYDIN ADNAN MENDERES UNIVERSITY
# COURSE INFORMATION FORM

| Course Title | Luminescence in Solids and Applications I | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | FZK531 | | Couse Level | Second Cycle (Master's Degree) | | | |
| ECTS Credit | 6 | Workload | 150 *(Hours)* | Theory | 3 | Practice | 0 | Laboratory | 0 |
| Objectives of the Course | To get information about the fundamental principles of luminescence in solids and its applications. | | | | | | |
| Course Content | Fundamentals of luminescence. Emission and excitation mechanism in luminescent materials. Non radiactive transitions. Energy transfer. Luminescence applications. | | | | | | |
| Work Placement | N/A | | | | | | |
| Planned Learning Activities and Teaching Methods | | | | Explanation (Presentation), Experiment, Individual Study, Problem Solving | | | |
| Name of Lecturer(s) | | | | | | | |

## Assessment Methods and Criteria

| Method | Quantity | Percentage (%) |
|---|---|---|
| Midterm Examination | 1 | 40 |
| Final Examination | 1 | 40 |
| Assignment | 7 | 20 |

## Recommended or Required Reading

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|---|---|
| 1 | Luminescent materials. G.Blasse, B.C. Grabmaier. |
| 2 | Luminescent materials and applications. Adrian Kitai. |
| 3 | Luminescence from theory to applications. Cees Ronda |
| 4 | Thermoluminescence of solids. S.W.S McKeever |
| 5 | Optically stimulated luminescence: Fundamentals and applications. E.G. Yukihara, S.W.S McKeever |
| 6 | Photoluminescence and Cathodoluminescence. Lyuji Ozawa |

## Weekly Detailed Course Contents

| Week | Weekly Detailed Course Contents | |
|---|---|---|
| 1 | Theoretical | Introduction to luminescent materials |
| 2 | Theoretical | Fundamentals of luminescence |
| 3 | Theoretical | Excitation in luminescent materials I |
| 4 | Theoretical | Excitation in luminescent materials II |
| 5 | Theoretical | Emission in luminescent materials I |
| 6 | Theoretical | Emission in luminescent materials II |
| 7 | Theoretical | Nonradiative transitions |
| 8 | Theoretical | Midterm exam |
| 9 | Theoretical | Energy transfer |
| 10 | Theoretical | Thermoluminescence |
| 11 | Theoretical | Optically stimulated luminescence |
| 12 | Theoretical | Photoluminesce |
| 13 | Theoretical | Radioluminescence |
| 14 | Theoretical | Cathodoluminescence |
| 15 | Theoretical | Other applications |
| 16 | Theoretical | Final exam |

## Workload Calculation

| Activity | Quantity | Preparation | Duration | Total Workload |
|---|---|---|---|---|
| Lecture - Theory | 14 | 3 | 3 | 84 |
| Assignment | 7 | 3 | 3 | 42 |
| Midterm Examination | 1 | 7 | 5 | 12 |

| Final Examination | 1 | 7 | 5 | 12 |
|---|---|---|---|---|
| | | | Total Workload (Hours) | 150 |
| | | | [Total Workload (Hours) / 25*] = **ECTS** | 6 |

*\*25 hour workload is accepted as 1 ECTS*

**Learning Outcomes**

| 1 | Students can understand the luminescence phenomenon. |
|---|---|
| 2 | Students can express the emission and excitation mechanism in luminescent materials. |
| 3 | Students can explain energy transfers, radiative and nonradiative transitions and show them on diagram. |
| 4 | Students can tell the general application areas of luminescence. |
| 5 | Students can identify the types of luminescence. |

**Programme Outcomes** *(Physics Master)*

| 1 | The student should conceive the concepts in physics and may apply them on her/his own |
|---|---|
| 2 | The student should be able to conceive the relationship between the different physics laws and integrity of them and apply them in solving different physics problems |
| 3 | The student should know the basic principles of classical, quantum and relativistic physics and use them in the solutions of problems |
| 4 | The student should be able to do research in a specific area of physics |
| 5 | The student should be able to prepare reports on papers on the subject of her/his research and present her/his research subject in scientific conferences |
| 6 | The student should be able to explain the relationship between complicated problems and basic physics laws. |
| 7 | The student should be able to use computers for solving complicated physics problems |
| 8 | The student should be able to interrelate between the theory and the experiment. If she/he is experimentalist he/she has to explain the theory behind her/his work. If she /he is a theorist she/he should has to know the experiments in her/his subject. |

**Contribution of Learning Outcomes to Programme Outcomes** *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

| | L1 | L2 | L3 | L4 | L5 |
|---|---|---|---|---|---|
| P1 | 4 | 3 | 4 | 4 | 5 |
| P2 | 5 | 4 | 4 | 3 | 3 |
| P3 | 4 | 3 | 3 | 5 | 4 |
| P4 | 3 | 5 | 5 | 5 | 4 |
| P5 | 3 | 5 | 3 | 4 | 3 |
| P6 | 4 | 4 | 2 | 3 | 4 |
| P7 | 2 | 2 | 2 | 2 | 5 |
| P8 | 4 | 3 | 3 | 3 | 4 |