# SMART MATERIALS

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| 1 | Course Title: | SMART MATERIALS |
| 2 | Course Code: | INS5048 |
| 3 | Type of Course: | Optional |
| 4 | Level of Course: | Third Cycle |
| 5 | Year of Study: | 1 |
| 6 | Semester: | 2 |
| 7 | ECTS Credits Allocated: | 6.00 |
| 8 | Theoretical (hour/week): | 3.00 |
| 9 | Practice (hour/week): | 0.00 |
| 10 | Laboratory (hour/week): | 0 |
| 11 | Prerequisites: | None |
| 12 | Language: | Turkish |
| 13 | Mode of Delivery: | Face to face |
| 14 | Course Coordinator: | Doç. Dr. MURAT ÖZTÜRK |
| 15 | Course Lecturers: | |
| 16 | Contact information of the Course Coordinator: | muratozturk@uludag.edu.tr |
| 17 | Website: | |
| 18 | Objective of the Course: | Introduces concepts and applications of smart materials, which refer to materials that can sense a certain stimulus and, in some cases, even react to the stimulus in a positive way so as to counteract negative effects of the stimulus. |
| 19 | Contribution of the Course to Professional Development: | To provide detailed information about structural materials. |
| 20 | Learning Outcomes: | |

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| | 1 | Understanding the detection mechanism |
| | 2 | Learning smart material design |
| | 3 | Understanding multifunctional materials |
| | 4 | To find and interpret a recently published technical paper and present it in the class |
| | 5 | Ability to identify and interpret an up-to-date technical article and make an oral presentation about it |
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21 Course Content:

**Course Content:**

| Week | Theoretical | Practice |
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| 1 | Introduction to multifunctional structural materials | |
| 2 | Construction materials with external sensors | |
| 3 | Construction materials with internal sensors | |
| 4 | Self-sensing structural materials | |

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| **5** | Piezoelectric materials and applications | |
| **6** | Strain/strain sensors and application areas | |
| **7** | Electromagnetic wave theory | |
| **8** | Electromagnetic wave absorber materials | |
| **9** | Designing multifunctional structural materials design | |
| **10** | Designing multifunctional structural materials | |
| **11** | Shape memory building materials | |
| **12** | Usage areas of carbon-based materials | |
| **13** | Testing smart materials | |
| **14** | Project presentation | |

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| **22** | Textbooks, References and/or Other Materials: | Lecture notes and literature. |
| **23** | Assesment | |

| **TERM LEARNING ACTIVITIES** | **NUMBER** | **WEIGHT** |
|---|---|---|
| Midterm Exam | 1 | 40.00 |
| Quiz | 0 | 0.00 |
| Home work-project | 0 | 0.00 |
| Final Exam | 1 | 60.00 |
| Total | 2 | 100.00 |

| Activites | Number | Duration (hour) | Total Work Load (hour) |
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| Contribution of Final Exam to Success Grade | 60.00 | | |
| Theoretical | 14 | 3.00 | 42.00 |
| Total | 100.00 | | |
| Practicals/Labs | 0 | 0.00 | 0.00 |
| Self study and preperation | 14 | 7.00 | 98.00 |
| Homeworks | 0 | 0.00 | 0.00 |
| Projects | 0 | 0.00 | 0.00 |
| Field Studies | 0 | 0.00 | 0.00 |
| Midterm exams | 1 | 20.00 | 20.00 |
| Others | 0 | 0.00 | 0.00 |
| Final Exams | 1 | 20.00 | 20.00 |
| Total Work Load | | | 180.00 |
| Total work load/ 30 hr | | | 6.00 |
| ECTS Credit of the Course | | | 6.00 |

Measurement and Evaluation Techniques Used in the Course: Measurement and evaluation is carried out according to the priciples of Bursa uludag University Associate and

| **24** | **ECTS / WORK LOAD TABLE** |
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| **25** | **CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PQ1** | **PQ2** | **PQ3** | **PQ4** | **PQ5** | **PQ6** | **PQ7** | **PQ8** | **PQ9** | **PQ10** | **PQ11** | **PQ12** | **PQ13** | **PQ14** | **PQ15** | **PQ16** |
| **ÖK1** | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK2** | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK3** | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK4** | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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| **ÖK5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| **LO: Learning Objectives PQ: Program Qualifications** | | | | | |
|---|---|---|---|---|---|
| **Contribution Level:** | **1 very low** | **2 low** | **3 Medium** | **4 High** | **5 Very High** |