

# POWER ELECTRONICS FOR HYBRID AND ELECTRIC VEHICLES

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|------|--|--|---|
| 1    | Course Title:  | POWER ELECTRONICS FOR HYBRID AND ELECTRIC VEHICLES   |   |
| 2    | Course Code:   | OHE5020  |   |
| 3    | Type of Course:  | Optional   |   |
| 4    | Level of Course:   | Second 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:   |  |   |
| 12   | Language:  | Turkish  |   |
| 13   | Mode of Delivery:  | Face to face   |   |
| 14   | Course Coordinator:  | Prof. Dr. GÜNEŞ YILMAZ   |   |
| 15   | Course Lecturers:  |  |   |
| 16   | Contact information of the Course Coordinator:   | Prof. Dr. Güneş YILMAZ<br>B.U.Ü. Elektrik-Elektronik Mühendisliği Bölümü<br>gunesy@uludag.edu.tr |   |
| 17   | Website:   |  |   |
| 18   | Objective of the Course:   |  |   |
| 19   | Contribution of the Course to Professional Development:  |  |   |
| 20   | Learning Outcomes:   |  |   |
|      |  | 1  | Recognition of power electronics application areas in hybrid and electric vehicles  |
|      |  | 2  | To have the necessary theoretical foundations for the design of power electronics technologies in hybrid and electric vehicles. |
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|      |  | 10   |   |
| 21   | Course Content:  |  |   |
|      |  | <b>Course Content:</b>   |   |
| Week | Theoretical  | Practice   |   |
| 1    | Power electronics introduction, historical development and power electronics circuit elements used in electric and hybrid vehicles |  |   |
| 2    | Examination of semiconductor circuit elements diode, power diode, diac   |  |   |
| 3    | Examination of semiconductor circuit elements, thyristor, triac  |  |   |

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|--|--|--|-----------------|------------------------|
| 4  | Structure of trigger circuits, working principles  |  |                 |                        |
| 5  | Rectification circuits 1-phase half, full, controlled and uncontrolled circuit designs and sample applications |  |                 |                        |
| 6  | Rectification circuits 1-phase half, full, controlled and uncontrolled circuit designs and sample applications |  |                 |                        |
| 7  | Rectification circuits 3-phase half, full, controlled and uncontrolled circuit designs and sample applications |  |                 |                        |
| 8  | Midterm  |  |                 |                        |
| 9  | Rectification circuits 3-phase half, full, controlled and uncontrolled circuit designs and sample applications |  |                 |                        |
| 10   | Chopper circuits AC and DC choppers  |  |                 |                        |
| 11   | Inverter circuits and applications   |  |                 |                        |
| 12   | Frequency choppers and their applications  |  |                 |                        |
| 13   | Power management in multiple storage and resource systems  |  |                 |                        |
| 14   | Solving sample applications and making designs   |  |                 |                        |
| 22   | Textbooks, References and/or Other Materials:  | Referans<br>1. Hacettepe University Electrical and Electronics Engineering Department, ELE 454 ELE 454 Power Electronics |                 |                        |
| Activites  |  | Number   | Duration (hour) | Total Work Load (hour) |
| Theoretical  |  | 14   | 3.00            | 42.00                  |
| 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                   |
| TERM LEARNING ACTIVITIES                                 |  | NUMBER   | WEIGHT          |                        |
| Field Studies  |  | 0  | 0.00            | 0.00                   |
| Midterm Exams  |  | 0  | 0.00            | 0.00                   |
| Others   |  | 0  | 0.00            | 0.00                   |
| Final Exams  |  | 0  | 40.00           | 40.00                  |
| Total Work Load  |  |  |                 | 180.00                 |
| Total work load/ 30 hr                                   |  | 1  | 100.00          | 6.00                   |
| ECTS Credit of the Course                                |  |  |                 | 6.00                   |
| Success Grade  |  |  |                 |                        |
| Contribution of Final Exam to Success Grade              |  | 100.00   |                 |                        |
| Total  |  | 100.00   |                 |                        |
| Measurement and Evaluation Techniques Used in the Course |  | Ölçme ve değerlendirme, Bursa Uludağ Üniversitesi Lisansüstü Eğitim Öğretim Yönetmeliği ilkelerine göre yapılmaktadır.   |                 |                        |
| 24   | ECTS / WORK LOAD TABLE   |  |                 |                        |

|   |   |     |     |       |     |     |          |     |     |        |      |      |             |      |      |      |
|---|---|-----|-----|-------|-----|-----|----------|-----|-----|--------|------|------|-------------|------|------|------|
| 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   | 0   | 5   | 0   | 0     | 0   | 0   | 0        | 0   | 0   | 0      | 0    | 0    | 0           | 0    | 0    | 0    |
| ÖK2   | 0   | 5   | 0   | 5     | 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 |      |      |      |