**COURSE SPECIFICATION**

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| This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification. |

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| University of Baghdad | 1. Teaching Institution |
| College of Engineering / Department of Energy | 2. University Department/Centre |
| Power ElectronicsEE408 | 3. Course title/code |
| B.Sc | 4. Programme(s) to which it contributes |
| Weekly | 5. Modes of Attendance offered |
| Yearly | 6. Semester/Year |
| 90 hours | 7. Number of hours tuition (total) |
| 1/12/2022 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| Identify and analyze the functions, structure, operation, characteristics and applications of different power electronic convertersas rectifiers, inverters, choppers, ac voltage controllers and cycloconverters. | |
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| 10· Learning Outcomes, Teaching ,Learning and Assessment Methods |
| 1. Knowledge and Understanding   A1.Identify the functions and characteristics of power electronic systems, converters and their components.  A2-Construct different circuits for uncontrolled rectifiers.  A3- Construct different circuits for phase-controlled converters as rectifiers, inverters, cycloconverters, and ac voltage controllers.  A4 -Construct different circuits for switching converters as choppers, inverters and rectifiers.  A5- Applications of power electronic systems. |
| B. Subject-specific skills  B1-Solve the performance parameters of different converters.  B2 -Analyze power electronic circuits as rectifiers, inverters, choppers, ac voltage controllers and cycloconverters.  B3 - Design power electronic systems for power supplies, motor drives and power system applications. |
| Teaching and Learning Methods |
| Lecturing..1  Discussions with the students. .2  Solving examples..3  Carrying out lab experiments..4 |
| Assessment methods |
| 1. Weekly quizzes.  2. Periodic home works.  Monthly and yearly exams..3  . Practical and theoretical inspections in the laboratory.4 |
| C. Thinking Skills  C1- Learningessential engineering concepts and terms.  C2**-** Using related techniques for solving problems. |

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| D. General and Transferable Skills (other skills relevant to employability and personal development)  D1- Ability to construct and analyze power converters and systems.  D2-Applying different interface circuits with renewable energy systems. |

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| 11. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| Theoretical and practical tests | Lectures, examples, discussions &lab experiments | Basics of power electronic systems | Structure and functions | 3 | 1 |
| Ditto | Ditto |  | Components | 3 | 2 |
| Ditto | Ditto |  | Performance characteristics | 3 | 3 |
| Ditto | Ditto | Power semiconductors | Types and operation | 3 | 4 |
| Ditto | Ditto |  | Characteristics: power, switching & losses | 3 | 5 |
| Ditto | Ditto | Uncontrolled rectifiers | Single-phase circuits: 1-pulse | 3 | 6 |
| Ditto | Ditto |  | 2-pulse circuits | 3 | 7 |
| Ditto | Ditto |  | Three-phase circuits: 3-pulse | 3 | 8 |
| Ditto | Ditto |  | 6-pulse circuits | 3 | 9 |
| Ditto | Ditto |  | Review | 3 | 10 |
| Ditto | Ditto | Phase-controlled converters | 1-pulse rectifiers | 3 | 11 |
| Ditto | Ditto |  | 2-pulse rectifiers | 3 | 12 |
| Ditto | Ditto |  | 3-pulse rectifiers | 3 | 13 |
| Ditto | Ditto |  | 6-pulse rectifiers | 3 | 14 |
| Ditto | Ditto | Full converters | Inverter circuits | 3 | 15 |
| Ditto | Ditto | Dual converters | cycloconverters | 3 | 16 |
| Ditto | Ditto |  | Ac voltagecontrollers | 3 | 17 |
| Ditto | Ditto |  | Review | 3 | 18 |
| Ditto | Ditto | Switching converters | Topology and switching schemes | 3 | 19 |
| Ditto | Ditto | Choppers | 1-switch circuits | 3 | 20 |
| Ditto | Ditto |  | Half & full-bridge circuits: Bipolar and unipolar PWM. | 3 | 21 |
| Ditto | Ditto | Voltage source inverters (VSIs) | Square-wavePWM inverters. | 3 | 22 |
| Ditto | Ditto |  | Sinusoidal PWM & Voltage PWM inverters. | 3 | 23 |
| Ditto | Ditto |  | Rectifier operation of VSIs. | 3 | 24 |
| Ditto | Ditto | Applications of power electronic systems | General review.  Dcpower supplies. | 3 | 25 |
| Ditto | Ditto |  | Ac power supplies | 3 | 26 |
| Ditto | Ditto |  | Dc motor drives | 3 | 27 |
| Ditto | Ditto |  | Ac motor drives | 3 | 28 |
| Ditto | Ditto |  | Power system interface | 3 | 29 |
| Ditto | Ditto |  | Power system interface | 3 | 30 |

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| 12. Infrastructure | | |
| 1. Power semiconductors. 2. Fourier analysis. 3. Circuit theory. 4. Power engineering. | Required reading:  · Lectures notes  · Text books  · References | |
| Matlab Simulink software for lab experiments. | Special requirements (include for example workshops, periodicals, IT software, websites) | |
|  | Community-based facilities  (include for example, guest  Lectures , internship , field studies) | |
| 13. Admissions | | |
|  | | Pre-requisites |
| 10 | | Minimum number of students |
| 30 | | Maximum number of students |