<table>
<tr><td>1.</td><td colspan="5">Name of Course</td><td>Power Electronics</td></tr>
<tr><td>2.</td><td colspan="5">Course Code</td><td>JPEL1123</td></tr>
<tr><td></td><td colspan="6">JPEL = the first alphabet identify the faculty within which the subject is offered., JPEL = the remaining three alphabet identify the course that offers the subject, 1123= the first digit identify level of study; in this case undergraduate level, 1123 = the second and third digits identify subject identity and 1123 = the fourth digit identify credit value or credit hours</td></tr>
<tr><td>3.</td><td colspan="5">Name(s) of academic staff</td><td>To be Assigned</td></tr>
<tr><td>4.</td><td colspan="5">Rationale for the inclusion of the course/module in the programme</td><td>Knowledge of basic Power Electronics is essential in electrical and electronic engineering. Moreover, acquiring knowledge in Power Electronics enable engineer to design power switching devices.</td></tr>
<tr><td>5.</td><td colspan="5">Semester and Year offered</td><td>Year 3, Semester 1</td></tr>
<tr><td rowspan="3">6.</td><td colspan="2">Total Student Learning Time (SLT)</td><td colspan="3">Face to Face</td><td>Total Guided and Independent Learning</td></tr>
<tr><td colspan="2" rowspan="2">L = Lecture T = Tutorial
P = Practical
IS= Independent Study</td><td>L</td><td>T</td><td>P</td><td>IS</td><td rowspan="2">Total Guided and Independent Learning = 120</td></tr>
<tr><td>42</td><td>7</td><td>6</td><td>65</td></tr>
<tr><td>7.</td><td colspan="5">Credit Value</td><td>3.0</td></tr>
<tr><td></td><td colspan="6">Lecture: 3 hours per week x 14 weeks
Tutorial: 1 hour per week x 7 weeks
Practical: 2 hours x 3weeks</td></tr>
<tr><td>8.</td><td colspan="5">Prerequisite (if any)</td><td>JELT1023:Electronics II</td></tr>
<tr><td>9.</td><td colspan="6">Course Objectives
1. To introduce the power Electronics;
2. To equip the students with the knowledge of the power switching devices.

Course Learning Outcomes (CLO)
At the end of the semester students should be able to:

CLO1: To State current and future applications of power electronics;
CLO2: To Identify the characteristics and applications of power semiconductor devices;
CLO3: To Analyze and design AC-DC rectifier circuits and recognizes the characteristic current and voltage harmonics generated.</td></tr>
<tr><td>10.</td><td colspan="6">Transferable Skills:
This course is expected the development of the following transferable skills:
▪ An ability to manage time and task
▪ An ability to learn both independently and co—operatively;
▪ An ability to take responsibility and carry out laboratory test;
▪ An ability to take initiative and lead other;
▪ An ability to use software where relevant to the subject.</td></tr>
<tr><td>11.</td><td colspan="6">Teaching-learning and assessment strategy

A variety of learning strategies are used throughout the course, including the following
• Classroom Lesson; Lecturer and power point presentation</td></tr>
</table>

	• Tutorial session • Student- lecturer Discussion • Collaborative and co-operative learn; • Independent study. **Assessment:** **Course works** **40%** Assignment 5% Tutorial 5% Quizzes 5% Laboratory works 10% Test 15% **Final Examination** **60%** **Total** **100%**
12.	**Synopsis:** This course is very important course in the field of electrical engineering. The objective of course is to introduce students to power switching devices and their applications.
13.	**Mode of Delivery:** Lectures; Tutorials ; Laboratory works

14.	**Assessment Methods and Types:** **Performance Criteria :**						
	CLO-PLO	**Assessment Tool**	**1**	**2**	**3**	**4**	**5**
	Marks		**0-39**	**40-49**	**50-59**	**60-74**	**75-100**
	Grade		**(F)**	**(D,D+)**	**(C-,C,C+)**	**(B-,B,B+)**	**(A-,A,A+)**
	CLO1: To State current and future applications of power electronics;	**Assignment** **Tutorials** **Quizzes** **Lab works** **Test** **Examination**	**Fail To:** - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Poor To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Satisfactory To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Good To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Excellent To:** - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test
	CLO2: To Identify the characteristics and applications of power semiconductor devices;	**Assignment** **Tutorials** **Quizzes** **Lab works** **Test** **Examination**	**Fail To:** - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Poor To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Satisfactory To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Good To:** - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Excellent To:** - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test
	CLO3: To Analyze and design AC-DC rectifier circuits and recognize the characteristic current and voltage harmonics generated;	**Assignment** **Tutorials** **Quizzes** **Lab works** **Test** **Examination**	**Fail To:** - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Poor To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Satisfactory To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Good To**: - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test	**Excellent To:** - manage time and task - learn both independently and cooperatively - take responsibility and carry out laboratory test

15. **Mapping of the Programme Objectives to the Programme Learning Outcomes**

Programme Learning Outcomes (PLO) / Programme Objectives (PO)	**PLO1:** Ability to acquire and apply knowledge of science and engineering fundamentals.	**PLO2:** Acquired in-depth technical competence in electrical engineering discipline.	**PLO3:** Ability to undertake problem identification, formulation and solution;	**PLO4:** Ability to utilise systems approach to design and evaluate operational performance.	**PLO5:** Understanding of the principles of design for sustainable development;	**PLO6:** Understanding of professional and ethical responsibilities and commitment to them.	**PLO7:** Ability to communicate effectively, not only with engineers but also with the community at large.	**PLO8:** Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;	**PLO9:** Understanding of the social, cultural, global and environmental responsibilities of a professional engineer	**PLO10:** Recognising the need to undertake lifelong learning, and possessing/acquiring the capacity to do so	**PLO11**: Ability become entrepreneur
PEO1: To produce graduates with excellent knowledge and competency in Electrical and Electronic Engineering;	✓	✓	✓				✓				
PEO2: To produce graduates with professional, generic attributes to meet the present and future global demands.							✓				
PEO3: To produce graduates with Islamic humanistic values and reinvention skills to meet the requirement of a dynamic environment. These skills include Civil Intelligence, Moral Intelligence, Self-Reliance and Communication Skills **;**							✓				

16. **Mapping of the course Learning Outcome to the Programme Outcome**

Programme Learning Outcomes (PLO) / Course Learning Outcome (CLO)	**PLO1:** Ability to acquire and apply knowledge of science and engineering fundamentals.	**PLO2:** Acquired in-depth technical competence in electrical engineering discipline.	**PLO3:** Ability to undertake problem identification, formulation and solution;	**PLO4:** Ability to utilise systems approach to design and evaluate operational performance.	**PLO5:** Understanding of the principles of design for sustainable development;	**PLO6:** Understanding of professional and ethical responsibilities and commitment to them.	**PLO7:** Ability to communicate effectively, not only with engineers but also with the community at large.	**PLO8:** Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;	**PLO9:** Understanding of the social, cultural, global and environmental responsibilities of a professional engineer	**PLO10:** Recognising the need to undertake lifelong learning, and possessing/acquiring the capacity to do so	**PLO11**: Ability become entrepreneur
CLO1: To State current and future applications of power electronics;	✓	✓	✓				✓				
CLO2: To Identify the characteristics and applications of power semiconductor devices;	✓	✓	✓				✓				
CLO3: To Analyze and design AC-DC rectifier circuits and recognize the characteristic current and voltage harmonics generated;	✓	✓	✓				✓				

17. **Content outline of the course/module and the SLT per topic**

Details		SLT(Hour)				
		L	**T**	**P**	**IS**	**Total**
Topic 1	**Introduction** • Overview, • Applications of Power Electronics • Modern Switching Semiconductor Devices Switching Characteristics	6	1	-	10	**17**
Topic 2	• The Ideal Switch, • Switching Functions, • Magnetics, • Transformers, Three-phase Systems	6	1	-	10	**17**
Topic 3	**Diode Circuits and Rectifiers (AC to DC Conversion)** • Rectifier Concepts, • Single Phase Half and Full Wave Diode Rectifiers With Resistive Load, • Inductive Load, • Capacitive Load • Three Phase Full-wave Rectifiers	9	2	-	12	**23**
Topic 4	**Phase Controlled Rectifiers (AC to DC Conversion)** • Natural and Forced Commutation, • Principle of Phase Controlled Converters • Single Phase Full Wave Converters, • Three Phase Half Wave Converters	6	1	-	10	**17**
Topic 5	**V. DC to DC Switchmode Converters** • Concept of Source Conversion: • Source vs. load , • Linear Regulators **Switchmode Converters** • Non-isolated Switchmode Converters • (Buck, Boost, Buck-Boost, Cuk) • Continuous and Discontinuous Conduction Modes **Isolated Switchmode Power Converters** • Single-ended Isolated Forward Converter Flyback Converter	9	2	-	13	**24**
Topic 6	**Polymers** • Structure and deformation • Degradation Strengthening mechanism (fiber reinforcement)	6	-	-	10	**16**

	Practical	1. Power Semiconductor Switches 2. Switch-mode Power Converter (Buck)	-	-	6	-	**6**
	Total SLT Hour		**42**	**7**	**6**	**65**	**120**
18.	**Main references supporting the course** 1. Mohan, N., T. Undeland, W. Robbins, Power Electronics: Converters, Applications, and Design, John Wiley & Sons, Inc., 2008						
	Additional references supporting the course						
19.	**Other additional information** All materials will be available to the students in the library.						