GAU, Faculty of Engineering

Course Unit Title	Electromagnetic Theory II
Course Unit Code	EEN348
Type of Course Unit	Compulsory, Electrical-Electronics Engineering
Level of Course Unit	3rd Year, Undergraduate
National Credits	4
Number of ECTS Credits Allocated	7 ECTS
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	3
Semester when the course unit is delivered	6. Semester, Spring
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisities and co-requisities	EEN347 Electromagnetic Theory I
Recommended Optional Programme Components	Vector Calculus and Differential Equations

Objectives of the Course: At the end of the course, students will be able to,

Analyse simple magnetic circuits

> Distinguish the mathematical expressions that represent waves and electromagnetic waves

Express the Wave Propagation

> Relate the electromagnetic waves with the classical and modern applications.

Learning Outcomes					
When this course has been completed the student should be able to Assessment.					
1	Analyze simple magnetic circuits	1			
2	Explain main characteristics of time varying fields	1			
3	Compute the field components under the given conditions	1			
4	Solve the one dimesional wave equation	1,2			
5	Formulate the polarization of plane waves	1,2			
Assesment Methods: 1. Written Exam, 2. Assignment 3. Project/Report, 4. Presentation, 5 Lab. Work					

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	5
2	Ability to design and conduct experiments as well as to analyze and interpret data	1
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	1
4	Ability to apply systems thinking in problem solving and system design	4
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	2
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3
7	Ability to express their ideas and findings, in written and oral form	2
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	2
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	1
10	Strong foundation on the fundamentals of Electrical and Electronics Engineering such as Circuit Theory, Signals, Systems, Control and Communications, which are necessary for successful practice in the field	5
11	Awareness on the contemporary requirements, methods and applications of the Electrical and Electronics Engineering	3
	CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate 4: High, 5:Very High)	

WeekExamsExams1Static Magnetic Fields2Faraday's Law3Magnetic Circuits and Transformers4Time Varying Fields and Maxwell's Equations5Equation of Continuity6Potential Functions7The Wave Equation8Solution of the one dimesional wave equation and the wave propagation9Solution of the one dimesional wave equation and the wave propagation10Time harmonic FieldsQuiz11Plane Waves12Boundary ConditionsQuizQuiz13Lossy Media14Polarization of WavesFinal15Fundamentals of antenasFinalFinalSystemFinalFinalSystemWrittenSystemWrittenSystemWrittenSystemVirttenSystemSystemSolution (hour)14Polarization of NavesVirttenSystemSolution (hour)Total1420%WrittenSystemSolution (hour)TotalQuiz20%System10100%Solution (hour)Total11	Course Content							
1Static Magnetic FieldsI2Faraday's JawI3Magnetic Circuits and TransformersI4Time Varying Fields and Maxwell's EquationsI5Equation of ContinuityI6Potential FunctionsI7The Wave EquationIII8IIIIIII9Solution of the one dimesional wave equation and the wave propagationMidterm10Time harmonic FieldsQuiz11Plane WavesQuiz12Bounday ConditionsQuiz13Lossy MediaI14Polarization of WavesFinal15Fundamentals of anttenasFinalRecommended SourcesTextbook: David K. Cheng, Fundamentals of Electromagnetics, McGraw-Hill, 1989.AssessmentAssessmentAssessmentCourse duration in class (including the Exam week)154Gourse duration in class (including the Exam week)154Course duration in class (including the Exam week)154Activities11515Activities11515Quiz182Course duration in class (including the Exam week)15460Lab and Tutorials11515Activities8216Quizz1344Project/Pr	Week				Exam s			
2 Faraday's Law Image Crucits and Transformers Image	1	Static Magnetic Fields						
A Magnetic Circuits and Transformers	2	Faraday's Law						
4Time Varying Fields and Maxwell's Equations15E Equation of continuity16Potential Functions17The Wave EquationMidterm9Solution of the one dimesional wave equation and the wave propagation110Time harmonic Fields011Plane Waves012Boundary Conditions013Lossy Media014Polarization of Waves115Fundamentals of antenasFinalRecommended SourcesTextbook: David K. Cheng, Fundamentals of Electromagnetics, McGraw-Hill, 1989.AssessmentAttendance5%Midterm30%WrittenCourseActivitiesActivitiesMidtermActivities	3	Magnetic Circuits and Transformers						
6 Potential Functions Image: Formation of the one dimesional wave equation and the wave propagation Midterm 9 Solution of the one dimesional wave equation and the wave propagation Midterm 10 Time harmonic Fields Quiz 11 Plane Waves Quiz 12 Boundary Conditions Quiz 13 Lossy Media Quiz 14 Polarization of Waves Final 15 Fundamentals of antenas Final Recommended Sources Textbook: David K. Cheng, Fundamentals of Electromagnetics, McGraw-Hill, 1989. Assessment Attendance 5% Written Quiz 20% Written Quiz 20% Written Guiz 20% Written Course duration in class (including the Exam week) 15 4 60 Las and Tutorials Activities 1 15 16 Project/Presentation/Report Writing 1 15 16 16 Quizes	4	Time Varying Fields and Maxwell's Equations	Time Varying Fields and Maxwell's Equations					
6 Potential Functions Initial Mathematican stress 7 The Wave Equation Midterm 9 Solution of the one dimesional wave equation and the wave propagation Midterm 10 Time harmonic Fields Quiz 11 Plane Waves Quiz 12 Boundary Conditions Quiz 13 Lossy Media Image: Solution of Waves Guiz 14 Polarization of Waves Final 15 Fundamentals of antenas Final Recommended Sources Textbook: David K. Cheng, Fundamentals of Electromagnetics, McGraw-Hill, 1989. Assessment Attendance 5% Midterm Quiz 20% Written Quiz 20% Written Cauz 20% Written Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials A 4 4 60 Labs and Tutorials 8 2 16	5	Equation of Continuity						
1 Ine wave equation Midterm 8	6	Potential Functions						
B Solution of the one dimesional wave equation and the wave propagation Mittleff 10 Time harmonic Fields	/	The Wave Equation			D 4 i alt a waa			
3Solution of the one differsional wave equation and the wave propagation10Time harmonic FieldsQuiz11Plane WavesQuiz12Boundary ConditionsQuiz13Lossy MediaInternational wave equation and the wave propagationQuiz14Polarization of WavesFinal15Fundamentals of antenasFinalRecommended SourcesTextbook: David K. Cheng, Fundamentals of Electromagnetics, McGraw-Hill, 1989.AssessmentAssessmentAttendance20/220%WrittenExam30%WrittenQuiz20%WrittenExam100%TotalCourse duration in class (including the Exam week)154Activities </td <td>8</td> <td>Solution of the one dimesional wave equation a</td> <td>nd the wave</td> <td>propagation</td> <td>wildterm</td>	8	Solution of the one dimesional wave equation a	nd the wave	propagation	wildterm			
Interfact tensorInterfact tensorQuiz12Boundary ConditionsQuiz13Lossy Media14Polarization of Waves15Fundamentals of anttenasFextbook: David K. Cheng, Fundamentals of Electromagnetic Theory, Addison-Wesley, 1994.Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989.AssessmentAttendance5%WrittenColspan="2">Textbook: David K. Cheng, Fundamentals of Electromagnetics, McGraw-Hill, 1989.AssessmentAttendance5%WrittenColspan="2">TotalQuiz20%WrittenTotalQuiz20%WrittenTotalQuiz20%WrittenTotalActivitiesMumberDuration (hour)TotalColspan="2">Colspan="2">TotalActivitiesAColspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"TotalActivitiesNumber <t< td=""><td>9 10</td><td>Time harmonic Fields</td><td>nu the wave</td><td>propagation</td><td></td></t<>	9 10	Time harmonic Fields	nu the wave	propagation				
12Boundary ConditionsQuiz13Lossy Media	10	Plane Wayes						
13 Lossy Media Image: Constraint of Waves Image: Constraint of Waves 15 Fundamentals of anttenas Final Recommended Sources Textbook: David K. Cheng, Fundamentals of Electromagnetic Theory, Addison-Wesley, 1994. Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989. Assessment Assessment Written Midterm 30% Quiz 20% Quiz 20% Viritten Total Total 100% ECTS Allocated Based on the Student Workload Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials - - Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials - - - - Assignments 4 4 16 1 15 15 Midterm Examination 1 15 15 15 16 16 16 16 16 16	12	Boundary Conditions			Quiz			
14 Polarization of Waves Final 15 Fundamentals of anttenas Final Recommended Sources Textbook: David K. Cheng, Fundamentals of Electromagnetic Theory, Addison-Wesley, 1994. Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989. Assessment Attendance 5% Midterm 30% Exam Written Quiz 20% Final 45% Quiz 20% Final 45% Quiz 20% Final 45% Written Total Total 100% ECTS Allocated Based on the Student Workload Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials - - Assignments 4 4 16 Project/Presentation/Report Writing 1 8 8 E-learning Activities 8 2 16 Quizzes 1 15 15 Midterm Examination 1 15 15 Self Study 13 4 52 Total Work	13	Lossy Media						
15 Fundamentals of anttenas Final Recommended Sources Textbook: David K. Cheng, Fundamentals of Electromagnetic, McGraw-Hill, 1989. Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989. Assessment Midterm Attendance 5% Written Quiz 20% Written Exam 45% Quiz 20% Total 100% Total Activities Bactivities <td< td=""><td>14</td><td>Polarization of Waves</td><td></td><td></td><td></td></td<>	14	Polarization of Waves						
Recommended Sources Textbook: David K. Cheng, Fundamentals of Electromagnetic Theory, Addison-Wesley, 1994. Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989. Assessment Attendance Midterm 30% Written Exam 30% Quiz 20% Final Exam 45% Optication Total Total Total Total Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials - - Assignments 4 4 16 Project/Presentation/Report Writing 1 1 15 15 Guizzes 1 15 15 15 Midterm Examination 1 15 15 15 Midterm Examination 1 15 15 15 Guizzes 1 15 15 15 15 15 15 15 15	15	Fundamentals of anttenas			Final			
Textbook: David K. Cheng, Fundamentals of Electromagnetic Theory, Addison-Wesley, 1994. Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989. Assessment Attendance 5% Midterm 30% Uriten Quiz 20% Written Quiz 20% Written Total 100% ECTS Allocated Based on the Student Workload Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials Assignments 4 60 Labs and Tutorials Assignments 4 4 4 16 Project/Presentation/Report Writing 1 8 8 E-learning Activities 8 2 16 Quizzes 1 15 15 Midterm Examination 1 15 15 Midterm Examination 1 15 15 Final Examination 1 15 15 Final Examination 1 15 15 Self Study 13 4 52 Total Workload	Recommende	d Sources						
Textbook: David K. Cheng, Fundamentals of Electromagnetic Theory, Addison-Wesley, 1994. Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989. Assessment Attendance 5% Midterm 30% Written Exam Written Total Quiz 20% Written Final Exam 45% Written Total 100% Total ECTS Allocated Based on the Student Workload Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials - - - - Resignments 4 4 16 Project/Presentation/Report Writing 1 8 8 2 16 Quizzes 11 15<			· •					
Supplementary Material (s): W. Hayt, Engineering Electromagnetics, McGraw-Hill, 1989. Assessment Attendance 5% Midterm 30% Vritten Exam Written Vritten Quiz 20% Written Vritten Total 100% Vritten Vritten ECTS Allocated Based on the Student Workload Number Duration (hour) Total Workload(hour) Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials - - - Assignments 4 4 16 Project/Presentation/Report Writing 1 8 8 E-learning Activities 8 2 16 Quizzes 11 15 15 Midterm Examination 1 15 15 Self Study 13 4 52 Total Workload/30 (h) 197 197 Total Workload/30 (h) 7 6.567	Textbook: Da	vid K. Cheng, Fundamentals of Electromagneti	ic Theory, A	ddison-Wesley, 1994.				
Assessment Attendance 5% Midterm 30% Quiz 20% Final Exam 45% Quiz 20% Final Exam 45% Total 100% ECTS Allocated Based on the Student Workload Total Activities Number Duration (hour) Total Workload(hour) Course duration in class (including the Exam week) 15 4 60 Labs and Tutorials - - - Assignments 4 4 16 Project/Presentation/Report Writing 1 8 8 E-learning Activities 8 2 16 Quizzes 1 15 15 Midterm Examination 1 15 15 Final Examination 1 15 15 Self Study 13 4 52 Total Workload 197 6.567 ECTS Credit of the Course 7 7	Supplementa	w Material (s): W. Hayt, Engineering Electroma	gnetics, Mc	Graw-Hill, 1989.				
Attendance5%Midterm30%WrittenExam20%WrittenGuiz20%WrittenFinal Exam45%WrittenTotal100%TotalECTS Allocated Based on the Student WorkloadActivitiesNumberDuration (hour)Total Workload(hour)Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload13452ECTS Credit of the Course77	Assessment							
Midterm Exam30%WrittenQuiz20%WrittenFinalExam45%Total100%WrittenECTS Allocated Based on the Student WorkloadCourse duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes1151515Final Examination11515Self Study13452Total Workload/30 (h)16.567ECTS Credit of the Course77	Attendance	5%						
ExamIntervQuiz20%WrittenFinal Exam45%WrittenTotal100%ECTS Allocated Based on the Student WorkloadECTS Allocated Based on the Student WorkloadCourse duration in class (including the Exam week)15460Labs and TutorialsAssignments441616Project/Presentation/Report Writing188216Quizzes115151515Midterm Examination1151515Final Examination1151515Self Study13452197Total Workload/30 (h)6.5676.567ECTS Credit of the Course-77	Midterm	30%	Written					
Quiz20%WrittenFinal Exam45%WrittenTotal100%TotalECTS Allocated Based on the Student WorkloadActivitiesNumberDuration (hour)Total Workload(hour)Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload/30 (h)-197ECTS Credit of the Course77	Exam		whiteen					
Final Exam45%WrittenTotal100%ECTS Allocated Based on the Student WorkloadActivitiesNumberDuration (hour)Total Workload(hour)Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload/30 (h)-197ECTS Credit of the Course7	Ouiz	20%	Written					
TotalTotalECTS Allocated Based on the Student WorkloadActivitiesNumberDuration (hour)Total Workload(hour)Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Self Study13452Total Workload13452Total Workload/30 (h)-6.567ECTS Credit of the Course77	Final Exam	45%	Written					
ECTS Allocated Based on the Student WorkloadActivitiesNumberDuration (hour)Total Workload(hour)Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload197197Total Workload/30 (h)77	Total	100%						
ActivitiesNumberDuration (hour)Total Workload(hour)Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload/30 (h)6.567ECTS Credit of the Course77		d Deced on the Student Monklead						
ActivitiesNumberDuration (hour)Total Workload(hour)Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload1976.567ECTS Credit of the Course77	ECTS Allocate	a based on the student workload			I			
Course duration in class (including the Exam week)15460Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload/30 (h)-6.567ECTS Credit of the Course77	Activities		Number	Duration (hour)	Total Workload(hour)			
Labs and TutorialsAssignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload197ECTS Credit of the Course77	Course durati	on in class (including the Exam week)	15	4	60			
Assignments4416Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload1976.567ECTS Credit of the Course7	Labs and Tuto	orials	-	-	-			
Project/Presentation/Report Writing188E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload1976.567ECTS Credit of the Course7	Assignments 4 4				16			
E-learning Activities8216Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload197ECTS Credit of the Course7	Project/Presentation/Report Writing 1 8				8			
Quizzes11515Midterm Examination11515Final Examination11515Self Study13452Total Workload197197Total Workload/30 (h)6.5677	E-learning Activities 8 2				16			
Midterm Examination11515Final Examination1151515Self Study13452197Total Workload1976.567ECTS Credit of the Course777	Quizzes		1	15	15			
Final Examination11515Self Study13452Total Workload197Total Workload/30 (h)6.567ECTS Credit of the Course7	Midterm Examination		1	15	15			
Self Study13452Total Workload197Total Workload/30 (h)6.567ECTS Credit of the Course7	Final Examination			15	15			
Total Workload197Total Workload/30 (h)6.567ECTS Credit of the Course7	Self Study	52						
Total Workload/30 (h)6.567ECTS Credit of the Course7	Total Worklo	197						
ECTS Credit of the Course 7	Total Worklo	6.567						
	ECTS Credit of the Course				7			