Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكة العربية السعودية
الهيئة الوطنية للتقويم
والاعتماد الأكاديمي

كلية العلوم التطبيقية
Faculty of Applied Sciences

Kingdom of Saudi Arabia
The National Commission for Academic Accreditation & Assessment

T6. Course Specifications (CS)

Course Title: Electromagnetism (2)

Course Code: 23064304-3

Course Specifications

Institution: **Umm AL – Qura University**	Date : **18/1/1439**
College/Department : **College of Applied Science – Department of Physics**	

A. Course Identification and General Information

1. Course title and code: **Electromagnetism (2) (code: 23064304-3)**
2. Credit hours: **3 Hrs**
3. Program(s) in which the course is offered. **BSc Physics**
(If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course
One of the academic staff member
5. Level/year at which this course is offered : **4st Year / Level 7**
6. Pre-requisites for this course (if any) : **Electromagnetism 1 (4033132-3)**
7. Co-requisites for this course (if any) : **Theortical Method in Physics 2 (4033141-4)**
8. Location if not on main campus: **Main campus and Alzaher**
9. Mode of Instruction (mark all that apply)

a. traditional classroom	✓	What percentage?	100%
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course?

- Define the fundamentals of electromagnetic field and radiations.
- Define the magnetic field, magnetic flux, magnetic scalar potential, magnetic vector potential.
- Apply Biot-Savart law to calculate the magnetic field due to electric current.
- Apply Lorentz law to calculate the force acting on a wire carrying electric current placed in a magnetic field.
- Calculate the magnetic field using Ampere's law.
- Define the Faraday law of electromagnetic induction.
- Calculate the self-inductance and mutual inductance.
- Calculate the magnetic field due to a magnetized object.
- Define the magnetization, magnetic intensity, the magnetic permeability, magnetic susceptibility.
- Define the hysteresis loop.
- Define the diamagnetism, Paramagnetism, and ferromagnetism.
- Calculate the magnetic energy stored within the electric circuits.
- Calculate the density of the magnetic energy.
- List the Maxwell's equations in vacuum and in the materials.
- Define the displacement current.
- Explain the electromagnetism in bulk materials (permittivity and permeability, D and H fields) and investigating the concepts of field potential and energy was spent.
- Discuss the Maxwell's equations and resulted in the triumphal prediction of electromagnetic radiation, but it's surprisingly hard to derive the specific equations for the radiation from an antenna.
- Describe, in words, the ways in which various concepts in electromagnetism come into play in particular situations; to represent these electromagnetic phenomena and fields mathematically in those situations; and to predict outcomes in other similar situations.

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

1- Outlines of the physical laws, principles and the associated proofs.
2. Highlighting the day life applications whenever exist.
3. Encourage the students to see more details in the international web sites and reference books in the library.
4. Frequently check for the latest discovery and application of magnetism in science

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:
The course will cover the principle of electromagnetism, such as calculating the magnetic field due to steady current, calculating the magnetic induction, Calculating the magnetic energy, the magnetic materials and their fields, Maxwell's equations and their applications, Electromagnetic waves, propagation of electromagnetic wave in different media. This course will provide a conceptual background in electromagnetism sufficient to enable students to take courses that are more advanced in related fields.

1 Topics to be Covered

Topics	No of Weeks	Contact hours
❖ **The Magnetic Field of Steady Current** 1. Induction to magnetic field, 2. Lorentz force law and its applications. 3. Biot-Savart Law and its applications. 4. Ampere's Law (differential and integral shape) 5. Application of Ampere's law. 6. Divergence and curl of magnetic field. 7. The Magnetic Vector Potential, 8. The Magnetic Scalar Potential 9. The Magnetic Flux	**4**	**12**
❖ **The Electromagnetic Induction** 1- Self Induction 2- Mutual Induction 3- The Neumann Formula	**1.33**	**4**

❖ **Magnetic Properties of Matter** 1. The origin of magnetism in the matter. 2. Magnetic moment of the atom. 3. Magnetization. 4. Magnetic current density. 5. Surface current density. 6. Magnetic Intensity. 7. Calculation of magnetic Field of a Magnetized Object. 8. Magnetic susceptibility, 9. Magnetic Permeability, 10. Hysteresis loop. 11. Classification of magnetic materials. 12. Diamagnetic materials 13. Paramagnetic materials. 14. Ferromagnetic materials. 15. Boundary condition of magnetic field. 16. Electric circuits containing magnetic media. 17. Magnetic circuits. 18. Examples.	**4**	**12**
❖ **Magnetic Energy** 1- Magnetic energy of a solid circuit. 2- Magnetic Energy of Coupled Circuits, 3- Energy Density in Magnetic Field, 4- Force and Torques on Rigid Circuits	**1.33**	**4**

❖ **Maxwell's Equation's and Electromagnetic Waves** 1- Displacement Current, 2- Maxwell's Equation's 3- Wave Equation for Electric and Magnetic Field 4- Plane Wave 5- Plane Waves in Isotropic Insulating Media 6- Transfer of Plane Waves in Conductor 7- Resistance of conductors at ultra high frequencies. 8- Applications of Maxwell's Equations a. Boundary Conditions. b. Refraction and Reflection at the boundary of two non-conducting media. 9- Electromagnetic waves Energy 10- The Wave Equation with Sources	**3.33**	**10**
	14 weeks	**42hrs**

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	42	28	42		22	134
Credit	**3**					

3. Additional private study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

On the table below are the five NQF Learning Domains, numbered in the left column.
First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table).
Second, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes.
Third, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Define the physical quantities, physical phenomena, and basic principles.	1- Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: Board, Power point. 4. Discussions 5. Brain storming 6. Start each chapter by general idea and the benefit of it.	Solve some example during the lecture. Discussions during the lectures Exams: a) Quizzes (E-learning) b) Short exams (mid- term exams) c) Long exams (final) d) Oral exams .
1.2	Describe the physical laws and quantities using mathematics		
2.0	**Cognitive Skills**		
2.1	Apply the laws of physics to calculate some quantities.	1. Preparing main outlines for teaching. 2. Following some proofs. 3. Define duties for each chapter	1. Exams (Midterm, final, quizzes) 2. Asking about physical laws previously taught
2.2	Solve problems in physics by using suitable mathematics.		
2.3	Analyse and interpret quantitative results.		

2.4	Apply physical principle on day life phenomena.	4. Encourage the student to look for the information in different references. 5. Ask the student to attend lectures for practice solving problem.	3. Writing reports on selected parts of the course. 4. Discussions of how to simplify or analyze some phenomena.
2.5	Derive the physical laws and formulas.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics	• Search through the internet and the library. • Small group discussion. • Enhance self-learning skills. • Develop their interest in Science through : (lab work, visits to scientific and research institutes).	• Evaluate the efforts of each student in preparing the report. • Evaluate the scientific reports. • Evaluate the team work in lab and small groups. • Evaluation of students presentations.
3.2	Work effectively in groups and exercise leadership when appropriate.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively in oral and written form.	• Incorporating the use and utilization of computer, software, network and multimedia through courses • preparing a report on some topics related to the course depending on web sites	• Evaluating the scientific reports. • Evaluating activities and homework
4.2	Collect and classify the material for the course.		
4.3	Use basic physics terminology in English.		
4.4	Acquire the skills to use the internet communicates tools.		
5.0	**Psychomotor (NA)**		

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.)																
Course LOs #	**Program Learning Outcomes (Use Program LO Code #s provided in the Program Specifications)**															
	1.1	**1.2**	**1.3**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**3.1**	**3.2**	**4.1**	**4.2**	**4.3**	**4.4**	**5.1**	**5.2**
1.1	✓															
1.2		✓														
1.3																
2.1				✓												
2.2					✓											
2.3						✓										
2.4							✓									
2.5								✓								
3.1									✓							
3.2										✓						
4.1											✓					
4.2												✓				
4.3													✓			
4.4														✓		
5.1																
5.2																

6. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Midterm 1	5th week	15%
2	Midterm 2	10th week	15%
3	Quizzes and In-Class Problem Solving	Each 2 weeks w	5%
4	Presence of students	All lectures	5%
5	Small project	12th week	5%
6	Homework	Every week	5%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

Each student will supervise by academic adviser in physics department and timetable for academic advice were given to the student each semester. (4hrs per week).

E Learning Resources

1. List Required Textbooks

1. Foundations of Electromagnetic Theory by Reitz, John R., Milford, Frederick J., Christy, Robert W. [Addison-Wesley, 2008] 4th Edition
2. Electromagnetic Fields and Waves by Paul Lorrain, Dale R. Corson, Francois Lorrain [W. H. Freeman and Company, 1988] 3rd Edition
3. Introduction to Electrodynamics by David J. Griffiths, [Prentice-Hall, Inc., 1999], 3rd Edition.

2. List Essential References Materials (Journals, Reports, etc.)

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

1. I.S. Grant and W.R. Phillips, Electromagnetism, Second Edition, John Wiley & Sons, New York, 2008.

2. Elements of Electromagnetics : M. N. O. sadiku [Oxford University Press, 2001] 3rd Edition
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc. 1. Web Sites, Social Media, Blackboard, Facebook, Twitter, etc.) 2. Consult courses in website of the certified universities,. 3. www.youtube.com.) 4. http://en.wikipedia.org/wiki/Electromagnetism
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. Wikipedia

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) 1- Lecture room for 30 students, Black (white) boards 2- Class room is already provided with data show
2. Computing resources (AV, data show, Smart Board, software, etc.) Providing classrooms with computers, data show, Smart Board, software, etc.)
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) NA

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching 3- Questionaries 4- Open discussion in the class room at the end of the lectures 5- Meeting with students 6- Open door policy
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department 7- Revision of student answer paper by another staff member. 8- Analysis the grades of students. 9- E-Learning Suggestions - e-Learning Documentation
3 Processes for Improvement of Teaching 1. Preparing the course as PPT. 2. Using scientific movies. 3. Coupling the theoretical part with laboratory part 4. Periodical revision of course content.

5. Report writing of the course and determine goals.
6. Fortification of the student learning.
7. Handling the weakness point

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

1. After the agreement of Department and Faculty administrations
2. The instructors of the course are checking together and put a unique process of evaluation.
3. Feedback evaluation of teaching from independent organization.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Periodical revision by Quality Assurance Units in the Department and institution for (Student evaluation, Course report, Program report, Program Self-study, Plan of improvement should be given.
- Collect all reports and evaluations at the end of the year for a reviewing purpose.
- Conduct a workshop to presents finding of reports and evaluation to share knowledge.

Name of Instructor: _____ Roshdi Seoudi _____

Signature: _____ Date Report Completed: _____

Name of Field Experience Teaching Staff _____

Program Coordinator:_____

Signature: _____ Date Received: _____