Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications

Electromagnetism

Institution: University of Dammam

Date: September 2014

College/Department : College of Science / Department of Physics

A. Course Identification and General Information

1. Course title and code: Electromagnetic I (Phys 303)
2. Credit hours: 3 (Lecture)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs): Bachelor of Physics / College of Science
4. Name of faculty member responsible for the course **:** **A specific team from the Physics Department**
5. Level/year at which this course is offered: Level 5
6. Pre-requisites for this course (if any): Phys 210
7. Co-requisites for this course (if any): Does not exist

8. Location if not on main campus: Physics Department/ College of Science.

9. Mode of Instruction (mark all that apply)

a. traditional classroom	Yes	What percentage?	60 %
b. blended (traditional and online)	Yes	What percentage?	33 %
c. e-learning	No	What percentage?	03%
d. correspondence	No	What percentage?	0%
f. other	Yes	What	3%

Comments: Used the Cooperative Education and interactive learning

B Objectives

1. What is the main purpose for this course?

The objective of this course is to covers the basic concepts and the theoretical foundations of electric charges at rest and in motion. It provides a thorough introduction to electrostatics, magnetostatics and electrodynamics. We will emphasize the inter-relationship between Electricity and Magnetism, culminating in the development of Maxwell's Equations. The examples and problems selected for the course give students the necessary knowledge and skills to read and analyze scientific data with a proper understand.

Students who successfully complete this course are expected to meet the following course outcomes.

- Students should be able to solve mathematical physics problems using vector calculus.
- Students should have a strong understanding of the fundamental physical concepts associated with static electric and magnetic fields
- Students should have an understanding of the practical relevance of electrostatic and magnetostatic concepts, such as how lightning rods work, how electric and magnetic fields come from power lines, etc.

- Students should be able to grasp the concepts of time varying fields and the implication of this concepts for future courses and applications
- Students should be able to communicate effectively through the technical writing of a report.

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)

- Explain strategy of the course in the beginning of the semester
- Outlines of the physical laws and relations, principles and the associated proofs.
- Lectures and power point presentation.
- Self learning.
- Open discussions.
- Group work.
- Used Black Board and e-learning.

- Small project.

- Highlighting the day life applications whenever exist.
- Encourage the students to see more details in the international web sites and reference books in the library.

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

Course Description:

	1. Topics to be Covered		
	List of Topics	No. of Weeks	Contact hours
	• **First contact** - define the program of the module - Distribution of grades of assessment		
	❖ Vector		
1a & 2a	- Scalar and cross products - Cartesian, cylindrical and spherical coordinates - Gradient, divergence and curl - Volume, surface and line integrals - Exercises	2	6
	❖		
3a	**✓ Coulomb's law and electrostatic fields in free space** - Electrical forces - Fields due to point charge in free space - Principle of Superposition - Exercises	0	3
4a	**✓ Electric Field due to continuous charge distributions** - Continuous charge distributions : line, surface and volume charge densities, - Electric fields due to continuous charge distributions - Exercises	0	3
5a	**✓ Gauss's law** - Electric Flux - Gauss's Law - Calculating the electric fields using the Gauss's law in situations with high degrees of symmetry of charge distributions - Exercises	1	3

5a	✓ **Electric Potential - electrostatic Energy** - Electric Potential - Relation between electric potential and electric field - Equipotential Lines - Electric potential due to point charges - Electric Potential due to continuous charge distributions - Electrostatic Energy - Exercises	1	3
6a	✓ **Laplace and Poisson equations** - Laplace and Poisson equations in Cartesian, cylindrical and spherical coordinates. - Exercises	1	3
7a	✓ **Electric fields in material space and boundary value problems** - Electric dipole, electric polarization, - Boundary conditions. - Exercises	1	3
	❖ **Magnetostatics**		
8a	✓ **Biot-Savart law** - Electric current - current distributions, - Magnetic Force - Biot-Savart's law - Exercises	0	3
9a	✓ **Ampere's Law** - Magnetic Flux - Ampere's Law - Calculating the magnetic fields using the Ampere 's law in situations with high degrees of symmetry of current distributions - Magnetic vector Potential - Relation between electric potential and electric field - Exercises	1	3
10a	✓ **Magnetic fields in material space and boundary value problems** - Magnetic dipole, Magnetic Properties of materials. - Boundary conditions - Exercises	0	3
	❖ **Maxwell's equations**		
11a& 12a	✓ **Electromagnetic induction** - Electromotive force - Faraday's law. - Maxwell's equation - Exercises	2	6

13a	Review for final exam	1	3

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	26	03	NA	NA	NA	33
Credit	26	03	NA	NA	NA	33

3. Additional private study/learning hours expected for students per week.	4

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	Course Teaching Strategie	Course Assessment Method
1.0	**Knowledge**		
1.1	• Apply vector calculus to understand the behavior of static electric and magnetic fields due to different source distributions. • Be familiar with solution techniques both the differential and integral forms in electrostatics and magnetostatics. • Solving electrostatic and magnetostatic boundary value problems	• Demonstrating the basic information and principles through lectures and the achieved applications	• Quizzes • Assignments • Homework
1.2	• An understanding of time-varying electromagnetic fields and Maxwell's equations.	• Discussing phenomena with illustrating pictures and diagrams • Solve some example	• Homework • Quizzes • Assignments
1.3	Improving logical thinking.	• Lecturing method:	• Quizzes

		• Blackboard • Power point • e-learning	• mid term exams • Final exams
1.4	To use mathematical formulation to describe the physical principle or phenomena	• Tutorials • Revisit concepts • Discussions	• Ask the student to clear the mis-understanding of so
2.0	**Cognitive Skills**		
2.1	• The ability to use physical laws and principles to understand the subject.	• Preparing main outlines for teaching • Define tasks for each chapter	• Assignments • Midterm's exam • Short quizzes
2.2	• The ability to simplify problems and analyze phenomena	• Lectures • Group work	• Asking about physical laws previously taught
2.3	• The Ability to identify, formulate and solve engineering problems.	• Open discussions • Group work • Homework assignments • Small project	• Writing reports on selected parts of the course
2.4	• Ability to represent the problems mathematically	• Encourage the student to look for the information in different	• Discussions of how to simplify or analyze
3.0	**Interpersonal Skills & Responsibility**		
3.1	• The students learn independently and take up responsibility	• Learn how to search the internet and use the library.	• Quizzes on the previous lecture. • Checking report
3.2	• The student fluent in dealing with others and collaborative work.	• Teamwork	• Mini project
3.3	• The student respects the opinions of others . The student accepts criticism.	• Interactive learning	• Assignments • Teamwork
4.0	**Communication, Information Technology, Numerical**		
4.1	• Feeling mathematical reality of solving. problems	• Know the basic physical principles. • Discuss with the student	Their interaction with the lectures and
5.0	**Psychomotor**		
5.1	NA	NA	NA
5.2			

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													
	Knowledge				Cognitive Skills				Interpersonal Skills & Responsibility			Communication, Information Technology,		Psychomotor
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	5.0
1a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
4a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
5a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
6a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
7a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
8a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
9a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
10a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
11a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
12a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
13a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project,	Week Due	Proportion of Total
1	Homework Activity / Assignments / Group works	Every week	10
2	Quizzes	4th and 10th weeks	10
3	Midterm exam 1	6th weeks	15
4	Midterm exam 2	12th weeks	15
5	Final exam	End of semester	50
6	Total		100

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)

- Faculty web-page with communication tolls in Black Board.
- 4 office hours/ week.

E Learning Resources

1. List Required Textbooks:

- Foundation of Electromagnetic Theory; 4th ed; Addison-wesley.
- Electromagnetic Fields and Waves: P.Lorrain, DR.Corson and F. Lorrain 3rd. ed., W.freeman.
- Fundamentals of Electromagnetic Theory: Reitz, Milford and Christy.

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

- M. N. O. Sadiku, Elements of Electromagnetics, 2rd Ed. Oxford University Press, 2001

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
Does not exist

4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
Consult courses in website of the certified universities, lectures in Youtube.

5. Other learning material such as computer-based programs/CD, professional standards or regulations and
software.
Does not exist

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.) Classrooms enough for 30 student, Black (white) boards
2. Computing resources (AV, data show, Smart Board, software, etc.) Computer, data show, Smart Board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list): Does not exist

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Via questionnaires
- Meeting with students
- e-suggestions
- Open door policy

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

Does not exist

3 Processes for Improvement of Teaching

- Report writing of the course and determine goals.
- Fortification of the student learning.
- 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)

- The instructors of the course are checking together and put a unique process of evaluation.

Feedback evaluation of teaching from independent organization.

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

- 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.