Course Specifications: Physics 2 MTH012

1. Basic Information

Program Title	Biomedical Engineering
Department offering the Program	Biomedical Engineering
Department Responsible for the Course	Engineering Mathematics and Physics
Course Code	MTH012
Year/ Level	Level 000
Specialization	Minor
Requirements	MTH012
Authorization data of course specification	

Teaching Hours	Lectures	Tutorial	Practical
	2	2	3

2. Course aims:

No.	Aim
1	Apply knowledge of optics and electricity physics related to engineering application.
4	Apply basic knowledge of physics to conduct experiments that help in the design of digital biomedical systems.

3. Intended Learning Outcomes (ILOs):

a. Knowledge and Understanding:

No.	Knowledge and Understanding
A1	Identify the concepts and theories of charge, electric field, potential, steady electric current, capacitors and magnetic field.
A2	Define the nature, interference, diffraction, and polarization of light, and relativity.
A_3	List the characteristics of engineering materials and their behavior related to the biomedical engineering field
A4	Recognize the principles of designing components of the experiments like Galvanometer, Voltammeter, ammeter, and polarizer.

b. Intellectual Skills

No.	Intellectual Skills
B1	Select appropriate topics of physics theory for analyzing biomedical problems.
B3	Solve biomedical engineering problems using physics theory in a creative and innovative manner.

c. Professional Skills

No.	Professional Skills
C1	Apply integrally knowledge of physical experiments to solve biomedical engineering problems.
C5	Apply computational facilities and techniques to conduct physical experiments related to biomedical systems.

d. General Skills

No.	General Skills
D1	Collaborate within team work in laboratory

4. Course Contents:

No.	Topics	Weeks
1	Coulomb's law	1
2	Gauss' law	2
3	Electric potential	3
4	Capacitance	4
5	Steady electric current and resistance. ***Experiments***: 1- Determine the value of unknown resistance by using metric bridge. 2- Verification of Ohm's law.	5
6	Magnetic field and magnetic force. ***Experiments***: The comparison between the moments of two permanent magnets.	6
7	Nature of light and electromagnetic spectrum. ***Experiments***: 1- Determine the refractive index of the prism's material.	7

	2- Determine the radius of curvature of lenses, and spherical mirrors.	
8	Interference of light waves	9
9	Diffraction of light waves	10
10	Polarization of light waves ***Experiments***: Verification of Malus' law.	11
11	Optical fibers	12
12	Lasers	13
13	Relativity	14

5. Teaching and Learning Methods:

No.	Teaching Method
1	Lectures
2	Discussion Sessions
3	Practical

6. Teaching and Learning Methods for Disable Students:

No.	Teaching Method	Reason
1	Extra lab time	To understand the experiments

7. Student Evaluation:

7.1 Student Evaluation Methods:

No.	Evaluation Method	ILOs
1	Mid Term Examination	A1, A2,A3, B1, C1.
2	Practical Examination	A1, A3, B1, C1, D1
3	Semester work	A1, A2, A4, B1, B3, C1, D1.
4	Final Term Examination	A1, A2, A4, B1, B3.

7.2 Evaluation Schedule:

No.	Evaluation Method	Weeks
1	Mid Term Examination	8
2	Practical Examination	13
3	Semester work	Every week
4	Final Term Examination	15

7.3 Weighting of Evaluations:

No.	Evaluation Method	Weights
1	Mid Term Examination	20 %
2	Practical Examination	10 %
3	Semester work	20 %
4	Final Term Examination	50 %
Total		100%

8. List of References

No.	Reference List
1	Physics for Scientists and Engineers, R.A. Serway and J.W. Jewett, 6th Edition, Thomson Brooks/Cole 2013.
2	Serway, Raymond A., and John W. Jewett. *Principles of physics*. Vol. 1. Fort Worth, TX: Saunders College Pub., 1998.
3	Pedrotti, Frank L., and Leno S. Pedrotti. "Introduction to optics 2nd edition."*Introduction to Optics 2nd Edition by Frank L. Pedrotti, SJ, Leno S. Pedrotti New Jersey: Prentice Hall, 1993* 1 (1993).
4	Knight, Randall D. Physics for scientists and engineers : a strategic approach : with modern physics. Boston London: Pearson, 2013.
5	Knight, Randall D. Student workbook for Physics for scientists and engineers, a strategic approach with modern physics, 3rd ed. Boston, Mass. London: Addison-Wesley, 2012.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom

2	Lab Facilities
3	White Board
4	Data Show System
5	Visualizer
6	Presenter
7	Sound System

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aims	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
1	Coulomb's law	1,4	A1, A3	B1		
2	Gauss' law	1,4	A1, A3	B1		D1
3	Electric potential	1,4	A1, A4, A3	B1	C1	D1
4	Capacitance	1,4	A1, A4	B2	C5	D1
5	Steady electric current and resistance.	1,4	A1, A4	B1	C1, C5	D1
6	Magnetic field and magnetic force.	1,4	A1	B2	C1, C5	
7	Nature of light and electromagnetic spectrum.	1,4	A2, A4	B2	C1, C5	D1
8	Interference of light waves	1,4	A2	B1		D1
9	Diffraction of light waves	1,4	A2	B1		
10	Polarization of light waves	1,4	A2	B1		D1
11	Optical fibers	1,4	A2	B1, B2	C1	
12	Lasers	1,4	A2	B1	C5	
13	Relativity	1,4	A2	B1		D1

Course Coordinator: Prof. Dr.
Head of Department: Assoc. Prof. Hossam Eldeen Moustafa
Date of Approval: