Sana'a University
Faculty of Engineering
Civil Engineering Department
Title of the Program: B.Sc. of Civil Engineering

Course Specification of Physics

I. Course Identification and General Information:

1	**Course Title:**	***Physics***				
2	**Course Code & Number:**	BR002				
3	**Credit hours:**	C.H				**Credit Hours**
		Th.	**Tu.**	**Pr.**	**Tr.**	
		2	2	2		4
4	**Study level/ semester at which this course is offered:**	First Level-First Semester				
5	**Pre –requisite (if any):**	Nil				
6	**Co –requisite (if any):**	Algebraic, Derivatives, and Integration				
8	**Program (s) in which the course is offered:**	Civil Engineering Program				
9	**Language of teaching the course:**	English				
10	**Location of teaching the course:**	Faculty of Engineering				
11	**Prepared By:**	Dr. Mohammad A. Algorafi				
12	**Date of Approval**					

II. Course Description:

This course introduces fundamental principles and concepts of theoretical and practical physics of importance to civil engineering, and their applications. Topics include: units, vectors, Newtonian mechanics, work and energy and their applications, fluids mechanics, heat, properties of engineering materials and applications, basic wave properties, light and sound.

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Characterize knowledge of, Physics sciences and its applications in the field of civil Engineering	A1
a.2	Describe the procedures of laboratory tests and the properties and behavior of construction materials related to Physics area.	A5
b.1	Integrate theories, rules and basic concepts to interpret physical events to formulate	B2
c1	Conduct experiments safely to verify theoretical concepts related to Physics area.	C1
c.2	solve Physics problems using suitable methods	C2
d.1	Write the report in project work	D1
d.2	Work in a team efficiently	D3
d.3	evaluate acquisition of new knowledge as a part of life- long learning strategy.	D5

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Characterize knowledge of, Physics sciences and its applications in the field of civil Engineering	Lecture Tutorial Reading	Written examination Problem set
a2- Describe the procedures of laboratory tests and the properties and behavior of construction materials related to Physics area.	Lecture Tutorial / demonstration Lab	Problem set lab examination

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- integrate theories, rules and basic concepts to interpret physical events to formulate	Lecture Presentations lab	Problem set examination

C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c.1 - Conduct experiments safely to verify theoretical concepts related to Physics area.	Lab representation	Lab reports Lab examination
c.2 - Solve Physics problems using suitable methods.	Lecture Tutorial / demonstration Discussions	Problem set – Quizzes examination

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d.1- Write the report in project work	Discussion sessions Lab	Write reports
d.2- Work in a team efficiently	Discussion sessions Lab	Write reports
d.3- Evaluate acquisition of new knowledge as a part of life- long learning strategy.	Discussion sessions Lab Independent study	Write reports

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IV. Course Content:

a – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction to Physics	a1, a2, b1	Introduction, Unit, Conversions, Dimensional Analysais, Vectors	1	2
2	Motion	a1, a2, b1, c2	In One-Dimension, a,v,s	1	2
3	Newton's Laws	a1, a2, b1, c2	The three laws– Gravitational Force	1	2
4	Work and Energy	a1, a2, b1, c2	The Work Done – Kinetic Energy – Potential Energy –	1	2
5	Fluid Mechanics	a1, a2, b1, c2	Fluid Flow Moving fluids; continuity principle, Bernoulli's theorem. Static fluids; pressure, Pascal's law.	**2**	4
6	Heat Transfer	a1, a2, b1, c2	Thermal Processes	2	4
7	properties and performance of engineering materials,	a1, a2, b1, c2	Elasticity: stress, strain, elastic moduli; Poisson's ratio; elastic limit; elasticity at the microscopic level	1	2
8	Oscillations and Waves	a1, a2, b1, c2	Mechanical oscillations (effect of wind on structures) waves (phase, mathematical representations and intensity - decibel scale)	2	4
9	Sound	a1, a2, b1, c2	, Sound Waves, Doppler's Effect, Linear superposition	1	2

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10	Light & Optics	a1, a2, b1, c2	Wave Motion absorption, emission and stimulated emission of photons coherence lasing action from population inversion laser safety	2	4
Number of Weeks /and Units Per Semester				**14**	**28**

b - Tutorial Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to Physics	1	2	a1, b1
2	Motion	1	2	a1, b1, c2
3	Newton's Laws	1	2	a1, b1, c2
4	Work and Energy	1	2	a1, b1, c2
5	Fluid Mechanics	2	4	a1, b1, c2
6	Heat Transfer	2	4	a1, b1, c2
7	Properties and performance of engineering materials,	1	2	a1, b1, c2
8	Oscillations and Waves	2	4	a1, b1, c2
9	Sound	1	2	a1, b1, c2
10	Light & Optics	2	4	a1, b1, c2
Number of Weeks /and Units Per Semester		**14**	**28**	

c - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Experiment of Measurements Tools and Devices	1	2	a2, c1, d1, d2, d3

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2	Verification of Newton's Laws	1	2	a2, c1, d1, d2, d3
3	Validation of Energy Conservation	1	2	a2, c1, d1, d2, d3
4	Calculation the Viscosity of the Fluid	2	4	a2, c1, d1, d2, d3
5	Determining the Specific Heat of a material	1	2	a2, c1, d1, d2, d3
6	Temperature dependent resistivity	2	4	a2, c1, d1, d2, d3
7	Determining the Deflection Force on a Charge moving in a magnetic Field	1	2	a2, c1, d1, d2, d3
8	Calculation the Speed of Sound in Air	2	4	a2, c1, d1, d2, d3
9	Spectrometer Analyzer (Light Analyzing Using a prism)	1	2	a2, c1, d1, d2, d3
10	Experiment of Light Interaction with Matter	2	4	a2, c1, d1, d2, d3
Number of Weeks /and Units Per Semester		**14**	**28**	

V. Teaching strategies of the course:

Lectures
Power Point
Lab
Solved Problems
Tutorials
Discussions
Independent study

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Motion	a1, a2, b1, c2	2	1
2	Newton's Laws	a1, a2, b1, c2	4	1
3	Work and Energy	a1, a2, b1, c2	5	1
4	Fluid Mechanics	a1, a2, b1, c2	7	1
5	Heat Transfer	a1, a2, b1, c2	8	1

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6	Properties and performance of engineering materials,	a1, a2, b1, c2	9	1
7	Oscillations and Waves	a1, a2, b1, c2	11	1
8	Sound	a1, a2, b1, c2	12	1
9	Light & Optics	a1, a2, b1, c2	14	2

VII. Reports:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Verification of Newton's Laws	a2, c1, d1, d2, d3	1	1
2	Validation of Energy Conservation	a2, c1, d1, d2, d3	2	1
3	Calculation the Viscosity of the Fluid	a2, c1, d1, d2, d3	3	1
4	Determining the Specific Heat of a material	a2, c1, d1, d2, d3	5	1
5	Temperature dependent resistivity	a2, c1, d1, d2, d3	6	1
6	Determining the Deflection Force on a Charge moving in a magnetic Field	a2, c1, d1, d2, d3	8	1
7	Calculation the Speed of Sound in Air	a2, c1, d1, d2, d3	9	1
8	Spectrometer Analyzer (Light Analyzing Using a prism)	a2, c1, d1, d2, d3	11	1
9	Experiment of Light Interaction with Matter	a2, c1, d1, d2, d3	12	2

3- Schedule of Assessment Tasks for Students During the Semester:

No	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	Weekly	10	5	a1, a2, b1, c2
2	Reports	Weekly	10	5	a2, c1, d1, d2, d3

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3	Quizzes	Two time randomly	10	5	b1, c2
4	Mid Test	7	20	10	a1, a2, b1, c2
5	Final Exam (lab)	14	30	15	a2, c1, d1, d2, d3
6	Final Exam (theoretical)	15	120	60	a1, a2, b1, c2
	Sum		200	100	

VIII. Learning Resources:

1- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

2- Raymond A.Serway, Robert J.Beichner and John W.Jewett, Jr. – 2000 – Physics For Scientists and Engineers With Modern Physics – 5th Edition – Saunders College Publishing

2- Essential References.

1- F.W. Seas, M.W. Zemansky and H.D. Young – 2003 - University Physics – Addison – Wesley Company
2- Budinski, K.G. & Budinski, M.K. "Engineering Materials Properties and Selection", Prentice Hall, 2009.
3- Stevens, W.R., "Building Physics: Lighting: Seeing in the Artificial Environment, Pergaman Press, 2013.

3- Recommended Books and Reference Materials.

1- David Halliday and Robert Resnick – 2007 – Fundamentals of Physics – 7th edition – John Willey Co.

I. Course Policies:

1	**Class Attendance:** The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	**Tardy:** The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
3	**Exam Attendance/Punctuality:**

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	The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
4	**Assignments & Projects**: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5	**Cheating:** If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquires.
6	**Plagiarism:** The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7	**Other policies**: - All the teaching materials should be kept out the examination hall. -The mobile phone is not allowed. -There should be a respect between the student and his teacher.

Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies** **Dr. Tarek A. Barakat** **Dr. Riyad A. Muharam**
	Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa **Dr. Ahmed mujahed** **Dr. Munaser Alsubri**

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Sana'a University
Faculty of Engineering
Civil Engineering Department
Title of the Program: B.Sc. of Civil Engineering

Template for Course Plan (Syllabus) of Physics

I. - Information about Faculty Member Responsible for the Course:

Name	Dr. Mohammad A. Algorafi	**Office Hours**					
Location& Telephone No.	Faculty of Engineering -Sana'a 770-521-271	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail		2		2		2	

II. Course Identification and General Information:

1-	**Course Title:**	***Physics***				
2-	**Course Number & Code:**	BR002				
3-	**Credit hours:**	C.H				**Credit Hours**
		Th.	**Tu.**	**Pr.**	**Tr.**	
		2	2	2		4
4-	**Study level/year at which this course is offered:**	First level / first year				
5-	**Pre –requisite (if any):**	Nil				
6-	**Co –requisite (if any):**	Nil				
7-	**Program (s) in which the course is offered**	Civil Engineering Program				
8-	**Language of teaching the course:**	English/Arabic				
9-	**System of Study:**	Regular				
10-	**Mode of delivery:**	Lecture, lab				
11-	**Location of teaching the course:**	Class, laboratory				

III. Course Description:

This course introduces fundamental principles and concepts of theoretical and practical physics of importance to civil engineering, and their applications. Topics include: units, vectors, Newtonian mechanics, work and energy and their applications, fluids mechanics,

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heat, properties of engineering materials and applications, basic wave properties, light and sound.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop**:**

a.1 Characterize knowledge of, Physics sciences and its applications in the field of civil Engineering A1
a.2 Describe the procedures of laboratory tests and the properties and behavior of construction materials related to Physics area. A5
b.1 Integrate theories, rules and basic concepts to interpret physical events to formulate B2
c.1 Conduct experiments safely to verify theoretical concepts related to Physics area. C1
c.2 solve Physics problems using suitable methods C2
d.1 Write the report in project work D1
d.2 Work in a team efficiently D3
d.3 Evaluate acquisition of new knowledge as a part of life- long learning strategy. D5

VI. Course Content:

- Distribution of Semester Weekly Plan Of course Topics/Items and Activities.

A –Theoretical Aspect:

Order	Topic List	Sub Topics List	Week Due	contact hours
1	Introduction to Physics	Introduction, Unit, Conversions, Dimensional Analysais, Vectors	1	2
2	Motion	In One-Dimension, a,v,s	2	2
3	Newton's Laws	The three laws– Gravitational Force	3,4	4
4	Work and Energy	The Work Done – Kinetic Energy – Potential Energy –	5	2
5	Fluid Mechanics	Fluid Flow Moving fluids; continuity principle, Bernoulli's theorem.	6,7	4

		Static fluids; pressure, Pascal's law.		
6	Midterm Exam		8	2
7	Heat Transfer	Thermal Processes	9	2
8	properties and performance of engineering materials,	Elasticity: stress, strain, elastic moduli; Poisson's ratio; elastic limit; elasticity at the microscopic level	10	2
9	Oscillations and Waves	Mechanical oscillations (effect of wind on structures) waves (phase, mathematical representations and intensity - decibel scale)	11,12	4
10	Sound	, Sound Waves, Doppler's Effect, Linear superposition	13	2
11	Light & Optics	Wave Motion absorption, emission and stimulated emission of photons coherence lasing action from population inversion laser safety	14,15	4
12	Final Exam		16	2
Number of Weeks /and Units Per Semester			**16**	**32**

B - Tutorial Aspect:

Order	Order	Order	Order
1	Introduction to Physics	1	2
2	Motion	2	2
3	Newton's Laws	3	2
4	Work and Energy	4	2
5	Fluid Mechanics	5,6	4
6	Heat Transfer	7,8	4

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7	properties and performance of engineering materials,	9	2
8	Oscillations and Waves	10,11	4
9	Sound	12	2
10	Light & Optics	13,14	4
Number of Weeks /and Units Per Semester		**14**	**28**

C- Practical Aspect:

Order	Practical Skills List	Number of Weeks	contact hours
1	Experiment of Measurements Tools and Devices	1	2
2	Verification of Newton's Laws	2	2
3	Validation of Energy Conservation	3	2
4	Calculation the Viscosity of the Fluid	4,5	4
5	Determining the Specific Heat of a material	6	2
6	Temperature dependent resistivity	7,8	4
7	Determining the Deflection Force on a Charge moving in a magnetic Field	9	2
8	Calculation the Speed of Sound in Air	10,11	4
9	Spectrometer Analyzer (Light Analyzing Using a prism)	12	2
10	Experiment of Light Interaction With Matter	13,14	4
Number of Weeks /and Units Per Semester		**14**	**28**

VII. Teaching strategies of the course:

Lectures.
Power Point
Lab
Solved Problems
Tutorials
Discussions
Independent study

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VIII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Motion	a1, a2, b1, c2	2	1
2	Newton's Laws	a1, a2, b1, c2	4	1
3	Work and Energy	a1, a2, b1, c2	5	1
4	Fluid Mechanics	a1, a2, b1, c2	7	1
5	Heat Transfer	a1, a2, b1, c2	8	1
6	properties and performance of engineering materials,	a1, a2, b1, c2	9	1
7	Oscillations and Waves	a1, a2, b1, c2	11	1
8	Sound	a1, a2, b1, c2	12	1
9	Light & Optics	a1, a2, b1, c2	14	2

I. Reports:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Verification of Newton's Laws	a2, c1, d1, d2, d3	1	1
2	Validation of Energy Conservation	a2, c1, d1, d2, d3	2	1
3	Calculation the Viscosity of the Fluid	a2, c1, d1, d2, d3	3	1
4	Determining the Specific Heat of a material	a2, c1, d1, d2, d3	5	1
5	Temperature dependent resistivity	a2, c1, d1, d2, d3	6	1
6	Determining the Deflection Force on a Charge moving in a magnetic Field	a2, c1, d1, d2, d3	8	1
7	Calculation the Speed of Sound in Air	a2, c1, d1, d2, d3	9	1
8	Spectrometer Analyzer (Light Analyzing Using a prism)	a2, c1, d1, d2, d3	11	1
9	Experiment of Light Interaction With Matter	a2, c1, d1,d2,d3	12	2

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IX. Schedule of Assessment Tasks for Students During the Semester:

No	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	Weekly	10	5
2	reports	Weekly	10	5
3	Quizzes	Two time randomly	10	5
4	Mid Test	7	20	10
5	Final Exam (lab)	14	30	15
6	Final Exam (theoretical)	15	120	60
	Sum		200	100

X. Learning Resources:

- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1- Raymond A.Serway, Robert J.Beichner and John W.Jewett, Jr. – 2000 – Physics For Scientists and Engineers With Modern Physics – 5th Edition – Saunders College Publishing

2- Essential References.

4- F.W. Seas, M.W. Zemansky and H.D. Young – 2003 - University Physics – Addison – Wesley Company

5- Budinski, K.G. & Budinski, M.K. "Engineering Materials Properties and Selection", Prentice Hall, 2009.

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XI. Course Policies:	
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3	**Exam Attendance/Punctuality:** The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
4	**Assignments & Projects**: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5	**Cheating**: If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquires.
6	**Plagiarism**: The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7	**Other policies**: - All the teaching materials should be kept out the examination hall. - The mobile phone is not allowed. -There should be a respect between the student and his teacher.

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