

# Republic of Yemen

Ministry of Higher Education & Scientific Research

21 September University for Medicals and Applied Sciences



Faculty of Clinical Pharmacy

**Bachelor of Clinical Pharmacy & Pharm. D.**

**Course Specification of Medical Physics**

Course Code. (06.11.208)

2022



Prepared by:

Dr. Abdulelah Thabet

Reviewed by:

Head of the Department:

Dr. -----

Vice Dean for Quality affairs

Dr. Abdulelah Thabet

Dean of College:

Dr. Ali Alyahawi

## Course Specification

### I. General Information:

|     |                                                  |                                                   |                      |                  |                         |
|-----|--------------------------------------------------|---------------------------------------------------|----------------------|------------------|-------------------------|
| 1.  | Course Title:                                    | Medical Physics                                   |                      |                  |                         |
| 2.  | Course Code:                                     | 06.11.208                                         |                      |                  |                         |
| 3.  | Credit Hours:                                    | Credit Hours                                      | Theory Contact Hours |                  | Practical Contact Hours |
|     |                                                  |                                                   | Lecture              | Tutorial/Seminar | Lab Clinical            |
|     |                                                  | 3                                                 | 2                    |                  | 2 --                    |
| 4.  | Level/ Semester at which this Course is offered: | 1 <sup>st</sup> d Level/ 1 <sup>st</sup> Semester |                      |                  |                         |
| 5.  | Pre –Requisite (if any):                         |                                                   |                      |                  |                         |
| 6.  | Co –Requisite (if any):                          |                                                   |                      |                  |                         |
| 7.  | Program (s) in which the Course is Offered:      | Bachelor of Clinical Pharmacy & Pharm. D.         |                      |                  |                         |
| 8.  | Language of Teaching the Course:                 | English                                           |                      |                  |                         |
| 9.  | Location of Teaching the Course:                 | Faculty of Clinical Pharmacy                      |                      |                  |                         |
| 10. | Prepared by:                                     |                                                   |                      |                  |                         |
| 11. | Date and Number of Approval by Council:          | 2022                                              |                      |                  |                         |

### II. Course Description:

This course deals with the study of physical parameters that are basics in various field of sciences including pharmacy.

### III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

#### 1. Alignment CILOs to PILOs

| No. | PILOs  | CILOs                                                                                                                                                                                      |
|-----|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | A1, A2 | a1. Determine the significance and its significant applications in modern sciences in particular medical sciences.                                                                         |
| 2.  |        | a2. Define basic physical parameters including those related to kinematics of objects, work, energy, pressure, electricity, light and sound                                                |
| 3.  |        | a3. Discuss the concepts and principles of basics physical phenomena related to movement, forces, electricity and light .                                                                  |
| 4.  | B1     | b1. Interpret physical phenomena presented in the topics such as electromagnetic fields, light-refractions                                                                                 |
| 5.  |        | b2. Compare between related physical parameters such as energy , force and power, and between light refraction and light scattering.                                                       |
| 6.  |        | b3. Relate basic physical parameters including those related to kinematics of objects, work, energy, pressure, electricity, light and sound to their affecting factors and governing laws. |
| 7.  |        | b4 .Assess the influence of changing of a physical parameter on the changing the physical phenomena                                                                                        |
| 8.  | C1     | c1. Identify the different types of radiation and its application in medicine                                                                                                              |
| 1.  |        | c2. Describe the main concept of nuclear medicine and radiation protection                                                                                                                 |

#### (A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:

| Course Intended Learning Outcomes |                                                                                                                                         | Teaching Strategies                                                                                                               | Assessment Strategies                                                                    |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| a1                                | Determine the significance and its significant applications in modern sciences in particular medical sciences.                          | <ul style="list-style-type: none"> <li>Lecture</li> <li>Instructor – student</li> <li>Interactive</li> <li>Office hour</li> </ul> | <ul style="list-style-type: none"> <li>Exam</li> <li>Assignment</li> <li>Quiz</li> </ul> |
| a2                                | Define basic physical parameters including those related to kinematics of objects, work, energy, pressure, electricity, light and sound |                                                                                                                                   |                                                                                          |

|                                                                                                                                       |                                                                                                                                                                                        |                                                                                                                                                            |                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| a3                                                                                                                                    | Discuss the concepts and principles of basics physical phenomena related to movement, forces, electricity and light                                                                    |                                                                                                                                                            |                                                                                                                  |
| (B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:               |                                                                                                                                                                                        |                                                                                                                                                            |                                                                                                                  |
| Course Intended Learning Outcomes                                                                                                     |                                                                                                                                                                                        | Teaching Strategies                                                                                                                                        | Assessment Strategies                                                                                            |
| b1                                                                                                                                    | b1.Interpret physical phenomena presented in the topics such as electromagnetic fields, light-refractions                                                                              | <ul style="list-style-type: none"><li>▪ Lecture</li><li>▪ Instructor – student Interactive</li><li>▪ Exercises</li><li>▪ Solving Problem Methods</li></ul> | <ul style="list-style-type: none"><li>▪ Problem-Solving Exercises.</li><li>▪ Assignment</li><li>▪ Quiz</li></ul> |
| b2                                                                                                                                    | Compare between related physical parameters such as energy , force and power, and between light refraction and light scattering.                                                       |                                                                                                                                                            |                                                                                                                  |
| b3                                                                                                                                    | Relate basic physical parameters including those related to kinematics of objects, work, energy, pressure, electricity, light and sound to their affecting factors and governing laws. |                                                                                                                                                            |                                                                                                                  |
| b4                                                                                                                                    | Assess the influence of changing of a physical parameter on the changing the physical phenomena                                                                                        |                                                                                                                                                            |                                                                                                                  |
| (C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods: |                                                                                                                                                                                        |                                                                                                                                                            |                                                                                                                  |
| Course Intended Learning Outcomes                                                                                                     |                                                                                                                                                                                        | Teaching Strategies                                                                                                                                        | Assessment Strategies                                                                                            |
| c1.                                                                                                                                   | Identify the different types of radiation and its application in medicine                                                                                                              | <ul style="list-style-type: none"><li>▪ Lectures</li><li>▪ Practical sessions</li></ul>                                                                    | <ul style="list-style-type: none"><li>▪ Exam</li><li>▪ Lab reports</li></ul>                                     |
| c2.                                                                                                                                   | Describe the main concept of nuclear medicine and radiation protection                                                                                                                 | <ul style="list-style-type: none"><li>▪ Lectures</li><li>▪ Practical sessions</li></ul>                                                                    | <ul style="list-style-type: none"><li>▪ Exam</li><li>▪ Lab reports</li></ul>                                     |
| (D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:               |                                                                                                                                                                                        |                                                                                                                                                            |                                                                                                                  |
| Course Intended Learning Outcomes                                                                                                     |                                                                                                                                                                                        | Teaching Strategies                                                                                                                                        | Assessment Strategies                                                                                            |
| d1                                                                                                                                    |                                                                                                                                                                                        | <ul style="list-style-type: none"><li>▪</li></ul>                                                                                                          | <ul style="list-style-type: none"><li>▪</li></ul>                                                                |

## IV. Course Content:

### A – Theoretical Aspect:

| Order                | Units/ Topics List                       | CILOs                     | Sub Topics List                                                                                                                                                                                                                                                                                           | No. of Weeks | contact hours |
|----------------------|------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|
| 1                    | <b>Introduction to physics</b>           | a1                        | <ul style="list-style-type: none"> <li>Definition, brief history; relation &amp; applications of physics to medical sciences</li> </ul>                                                                                                                                                                   | 1            | 2             |
| 2                    | <b>Kinematics &amp; Newtonian's laws</b> | a1, a2,a3, b1, b2, b3, b4 | <ul style="list-style-type: none"> <li>definition, parameters, Newtonian's law of motion, factors affecting including force, gravity, mass, etc.</li> <li>Applications in medical/pharmaceutical sciences.</li> </ul>                                                                                     | 2            | 4             |
| 3                    | <b>Work and Energy</b>                   | a1, a2,a3, b1, b2, b3, b4 | <ul style="list-style-type: none"> <li>Definitions</li> <li>differences between energy, work and Power Laws governing</li> <li>Forms and sources of energy (electric, optical, chemical, thermal, etc.)</li> <li>Applications in medical/pharmaceutical sciences.</li> </ul>                              | 3            | 8             |
| MID-TERM EXAM        |                                          |                           |                                                                                                                                                                                                                                                                                                           | 1            | 2             |
| 4                    | <b>Pressure</b>                          | a1,a2,a3, b1, b2, b3, b4  | <ul style="list-style-type: none"> <li>Definitions, types</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul>                                                                                                                                                 | 1            |               |
| 5                    | <b>Electricity</b>                       | a1, a2,a3, b1, b2, b3, b4 | <ul style="list-style-type: none"> <li>definition, brief history</li> <li>electromagnetic field, resistance, potential and current</li> <li>generation techniques</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul>                                         | 3            | 6             |
| 6                    | <b>Optical physics</b>                   | a1, a2,a3, b1, b2, b3, b4 | <ul style="list-style-type: none"> <li>photons, light waves, wave length, wave number, frequency.</li> <li>Light spectrum (visible, UV, IR, ..etc.), light absorbance, light refraction, light scattering</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul> | 2            | 4             |
| 7                    | <b>Sonic (sound) physics</b>             | a1, a2,a3, b1, b2, b3, b4 | <ul style="list-style-type: none"> <li>Sonic waves</li> <li>ultrasonic waves</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul>                                                                                                                              | 1            | 2             |
| <b>Course Review</b> |                                          | a1,a2,a3, b1, b2, b3      | Review of the course topics by discussion session.                                                                                                                                                                                                                                                        | 1            | 2             |
| FINAL – EXAM         |                                          |                           |                                                                                                                                                                                                                                                                                                           | 1            | 2             |

**Number of Weeks /and Units Per Semester**

16

7

**b - Practical Aspect**

| Order                                       | Tasks/ Experiments                                                   | CILOs (symbols)       | Number of Weeks | Contact Hours |
|---------------------------------------------|----------------------------------------------------------------------|-----------------------|-----------------|---------------|
| 1                                           | Definition and differentiation of data, informations and knowledge   | a1, a2, b1, b2,c1, c2 | 1               | 2             |
| 2                                           | Types of data presentation and how to express data as figures        | c1, c2                | 1               | 2             |
| 3                                           | Calculation of the relation between stress and strain                | ,c1, c2               | 1               | 2             |
| 4                                           | Gravity, friction and Buoyant forces                                 | b1, b2,c1, c2         | 1               | 2             |
| 5                                           | Mid-semester exam                                                    | a1, a2, b1, b2,c1, c2 | 1               | 2             |
| 6                                           | Calculation of the liquid viscosity                                  | b2,c1, c2             | 2               | 4             |
| 7                                           | Calculation of the relation between intensity and radiation exposure | b1, b2,c1, c2         | 2               | 4             |
| 8                                           | Intensity of Radiation                                               | a1, a2, b1, b2,c1, c2 | 1               | 2             |
| 9                                           | X-ray shielding and absorption                                       | a1, a2, b1, b2,c1, c2 | 1               | 2             |
| 10                                          | Final exam                                                           | a1, a2, b1, b2,c1, c2 | 1               | 2             |
| <b>Number of Weeks / Units per Semester</b> |                                                                      |                       | <b>14</b>       | <b>28</b>     |

**VII. Assignments:**

| No.          | Assignments    | Week Due | Mark     | Aligned CILOs (symbols)    |
|--------------|----------------|----------|----------|----------------------------|
| 1            | Assignment 1 : | 7th      | 2.5      | a1, a2, a3, b1, b2, b3, b4 |
| 2            | Assignment 2:  | , 14th   | 2.5      | a1, a2, a3, b1, b2, b3, b4 |
| <b>Total</b> |                |          | <b>5</b> |                            |

**VIII. 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       | 6th, 12th | 5    | 5%                             | All CILOs                        |

Prepared by:

Reviewed by:

Head of the Department:

Vice Dean for Quality affairs

Dean of College:

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Dr. -----

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|       |                          |                                   |     |      |              |
|-------|--------------------------|-----------------------------------|-----|------|--------------|
| 2     | Practical Reports        | 2 <sup>nd</sup> -13 <sup>th</sup> | 5   | 5%   | c1-c2        |
| 3     | Midterm Exam (Theory)    | Week 7                            | 15  | 20%  | a1-a2, b1-b2 |
|       | Midterm Exam (Practical) | Week 7                            | 10  | 10%  | c1-c2        |
| 4     | Final Practical Exam     | 14 <sup>th</sup>                  | 15  | 15%  | c1-c2        |
| 5     | Final Exam (Theory)      | Week 16                           | 50  | 50%  | a1-a2, b1-b4 |
| Total |                          |                                   | 100 | 100% |              |

## VIII. Learning Resources:

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

1. Physics of the Body, John Cameron, James G. Skofronick and Roderick M. Grant, Medical Physics Publishing Corporation; 2<sup>nd</sup> Edition, (1999).ISBN-13: 978-0944838914.

### 2- Essential References.

1. Parkash. An introduction to medical biophysics
2. Cameron, John R. and James G. Skofronick; Medical Physics. A Wiley-Interscience publication.
3. Physics in Biology and Medicine, Paul Davidovits, Academic Press 3<sup>rd</sup> edition (2007 )
4. Medical Physics and Biomedical Engineering, B.H. BrownTaylor& Francis; 1<sup>st</sup> edition (1999)

### 3- Electronic Materials and Web Sites etc.

[www.en.wikipedia.org/](http://www.en.wikipedia.org/)

## X. Course Policies: (Based on the Uniform Students' By law (2007)

|   |                                                                                                                                                                                               |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <b>Class Attendance:</b><br>Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.     |
| 2 | <b>Tardiness:</b><br>A student will be considered late if he/she is not in class after 10 minutes of the start time of class.                                                                 |
| 3 | <b>Exam Attendance/Punctuality:</b><br>No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed. |
| 4 | <b>Assignments &amp; Projects:</b><br>Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.        |
| 5 | <b>Cheating:</b><br>Cheating is an act of fraud that results in the cancelation of the student's exam or                                                                                      |

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|   |                                                                                                                                                                                                                                                                                |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.                                                                                                                                                 |
| 6 | <b>Forgery and Impersonation:</b><br>Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply. |
| 7 | <b>Other policies:</b><br>The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.                                     |

## Course Plan (Syllabus) of Medical Physics

Faculty of Clinical Pharmacy

**Bachelor of Clinical Pharmacy & Pharm. D.**

Course Code. (06.11.208)

2022

| I. - Information about Faculty Member Responsible for the Course: |                     |              |     |     |     |     |     |
|-------------------------------------------------------------------|---------------------|--------------|-----|-----|-----|-----|-----|
| Name of Faculty Member                                            |                     | Office Hours |     |     |     |     |     |
| Location & Telephone No.                                          | Pharmacy department | SAT          | SUN | MON | TUE | WED | THU |
| E-mail                                                            |                     |              |     |     |     |     |     |

## I. General Information:

|     |                                                  |                                                   |                      |                  |                         |
|-----|--------------------------------------------------|---------------------------------------------------|----------------------|------------------|-------------------------|
| 11. | Course Title:                                    | Medical Physics                                   |                      |                  |                         |
| 12. | Course Code:                                     | 06.11.208                                         |                      |                  |                         |
| 13. | Credit Hours:                                    | Credit Hours                                      | Theory Contact Hours |                  | Practical Contact Hours |
|     |                                                  |                                                   | Lecture              | Tutorial/Seminar | Lab                     |
|     |                                                  | 3                                                 | 2                    |                  | 2                       |
| 14. | Level/ Semester at which this Course is offered: | 1 <sup>st</sup> d Level/ 1 <sup>st</sup> Semester |                      |                  |                         |
| 15. | Pre –Requisite (if any):                         |                                                   |                      |                  |                         |
| 16. | Co –Requisite (if any):                          |                                                   |                      |                  |                         |
| 17. | Program (s) in which the Course is Offered:      | Bachelor of Clinical Pharmacy & Pharm. D.         |                      |                  |                         |
| 18. | Language of Teaching the Course:                 | English                                           |                      |                  |                         |
| 19. | Location of Teaching the Course:                 | Faculty of Clinical Pharmacy                      |                      |                  |                         |
| 20. | Prepared by:                                     |                                                   |                      |                  |                         |
| 11  | Date and Number of Approval by Council:          | 2022                                              |                      |                  |                         |

## III. Course Description:

This course deals with the study of physical parameters that are basics in various field of sciences including pharmacy.

### III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

#### 2. Alignment CILOs to PILOs

| No. | PILOs  | CILOs                                                                                                                                                                                      |
|-----|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | A1, A2 | a1. Determine the significance and its significant applications in modern sciences in particular medical sciences.                                                                         |
| 2.  |        | a2. Define basic physical parameters including those related to kinematics of objects, work, energy, pressure, electricity, light and sound                                                |
| 3.  |        | a3. Discuss the concepts and principles of basics physical phenomena related to movement, forces, electricity and light .                                                                  |
| 1.  | B1     | b1. Interpret physical phenomena presented in the topics such as electromagnetic fields, light-refractions                                                                                 |
| 2.  |        | b2. Compare between related physical parameters such as energy , force and power, and between light refraction and light scattering.                                                       |
| 3.  |        | b3. Relate basic physical parameters including those related to kinematics of objects, work, energy, pressure, electricity, light and sound to their affecting factors and governing laws. |
| 4.  |        | b4 .Assess the influence of changing of a physical parameter on the changing the physical phenomena                                                                                        |
| 5.  |        |                                                                                                                                                                                            |
| 1.  | C1     | c1. Identify the different types of radiation and its application in medicine                                                                                                              |
| 2.  |        | c2. Describe the main concept of nuclear medicine and radiation protection                                                                                                                 |

### V. Course Content:

#### A – Theoretical Aspect:

| Order | Units/ Topics List            | CILOs                     | Sub Topics List                                                                                                                                                                                                       | No. of Weeks | contact hours |
|-------|-------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|
| 1     | Introduction to physics       | a1                        | <ul style="list-style-type: none"> <li>Definition, brief history; relation &amp; applications of physics to medical sciences</li> </ul>                                                                               | 1            | 2             |
| 2     | Kinematics & Newtonian's laws | a1, a2,a3, b1, b2, b3, b4 | <ul style="list-style-type: none"> <li>definition, parameters, Newtonian's law of motion, factors affecting including force, gravity, mass, etc.</li> <li>Applications in medical/pharmaceutical sciences.</li> </ul> | 2            | 4             |

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|                                                |                              |                                 |                                                                                                                                                                                                                                                                                                             |    |   |
|------------------------------------------------|------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
| 3                                              | <b>Work and Energy</b>       | a1, a2,a3,<br>b1, b2, b3,<br>b4 | <ul style="list-style-type: none"> <li>Definitions</li> <li>differences between energy, work and Power Laws governing</li> <li>Forms and sources of energy (electric, optical, chemical, thermal, etc.)</li> <li>Applications in medical/pharmaceutical sciences.</li> </ul>                                | 3  | 8 |
| MID-TERM EXAM                                  |                              |                                 |                                                                                                                                                                                                                                                                                                             | 1  | 2 |
| 4                                              | <b>Pressure</b>              | a1,a2,a3,<br>b1, b2, b3,<br>b4  | <ul style="list-style-type: none"> <li>Definitions, types</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul>                                                                                                                                                   | 1  |   |
| 5                                              | <b>Electricity</b>           | a1, a2,a3,<br>b1, b2, b3,<br>b4 | <ul style="list-style-type: none"> <li>definition, brief history</li> <li>electromagnetic fieldmresistance, potential andcurrent</li> <li>generation techniques</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul>                                             | 3  | 6 |
| 6                                              | <b>Optical physics</b>       | a1, a2,a3,<br>b1, b2, b3,<br>b4 | <ul style="list-style-type: none"> <li>photons, light waves, wave length, wave number, frequency.</li> <li>Light spectrum (visible, UV, IR, ...,etc.), light absorbance, light refraction, light scattering</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul> | 2  | 4 |
| 7                                              | <b>Sonic (sound) physics</b> | a1, a2,a3,<br>b1, b2, b3,<br>b4 | <ul style="list-style-type: none"> <li>Sonic waves</li> <li>ultrasonic waves</li> <li>Echo</li> <li>Applications in medical/pharmaceutical sciences.</li> <li>Exercise Problems</li> </ul>                                                                                                                  | 1  | 2 |
| <b>Course Review</b>                           |                              | a1,a2,a3,<br>b1, b2, b3,<br>b4  | Review of the course topics by discussion session.                                                                                                                                                                                                                                                          | 1  | 2 |
| FINAL – EXAM                                   |                              |                                 |                                                                                                                                                                                                                                                                                                             | 1  | 2 |
| <b>Number of Weeks /and Units Per Semester</b> |                              |                                 |                                                                                                                                                                                                                                                                                                             | 16 | 7 |

#### b - Practical Aspect

| Order | Tasks/ Experiments                                                        | CILOs (symbols)       | Number of Weeks | Contact Hours |
|-------|---------------------------------------------------------------------------|-----------------------|-----------------|---------------|
| 1     | <b>Definition and differentiation of data, informations and knowledge</b> | a1, a2, b1, b2,c1, c2 | 1               | 2             |
| 2     | Types of data presentation and how to express data as figures             | ,c1, c2               | 1               | 2             |



|                                             |                                                                      |                        |           |           |
|---------------------------------------------|----------------------------------------------------------------------|------------------------|-----------|-----------|
| 3                                           | Calculation of the relation between stress and strain                | c1, c2                 | 1         | 2         |
| 4                                           | Gravity, friction and Buoyant forces                                 | b1, b2, c1, c2         | 1         | 2         |
| 5                                           | <b>Mid-semester exam</b>                                             | a1, a2, b1, b2, c1, c2 | 1         | 2         |
| 6                                           | Calculation of the liquid viscosity                                  | b2, c1, c2             | 2         | 4         |
| 7                                           | Calculation of the relation between intensity and radiation exposure | b1, b2, c1, c2         | 2         | 4         |
| 8                                           | Intensity of Radiation                                               | a1, a2, b1, b2, c1, c2 | 1         | 2         |
| 9                                           | X-ray shielding and absorption                                       | a1, a2, b1, b2, c1, c2 | 1         | 2         |
| 10                                          | Final exam                                                           | a1, a2, b1, b2, c1, c2 | 1         | 2         |
| <b>Number of Weeks / Units per Semester</b> |                                                                      |                        | <b>14</b> | <b>28</b> |

## VII. Assessment Methods of the Course:

خطأ! لم يتم العثور على مصدر المرجع.

- Assignments
- Quiz
- Exam
- Oral Presentation
- Proposal development
- Lab reports

## VIII. Assignments:

| No.          | Assignments    | Week Due | Mark     |
|--------------|----------------|----------|----------|
| 1            | Assignment 1 : | 7th      | 2.5      |
| 2            | Assignment 2:  | , 14th   | 2.5      |
| <b>Total</b> |                |          | <b>5</b> |

## IX. 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              | 6th, 12th                         | 5    | 5%                             | All CILOs                        |
| 2     | Practical Reports        | 2 <sup>nd</sup> -13 <sup>th</sup> | 5    | 5%                             | c1-c2                            |
| 3     | Midterm Exam (Theory)    | Week 7                            | 15   | 20%                            | a1-a2, b1-b2                     |
|       | Midterm Exam (Practical) | Week 7                            | 10   | 10%                            | c1-c2                            |
| 4     | Final Practical Exam     | 14 <sup>th</sup>                  | 15   | 15%                            | c1-c2                            |
| 5     | Final Exam (Theory)      | Week 16                           | 50   | 50%                            | a1-a2, b1-b4                     |
| Total |                          |                                   | 100  | 100%                           |                                  |

## X. Learning Resources:

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

- Physics of the Body, John Cameron, James G. Skofronick and Roderick M. Grant, Medical Physics Publishing Corporation; 2<sup>nd</sup> Edition, (1999). ISBN-13: 978-0944838914.

### 2- Essential References.

- Parkash. An introduction to medical biophysics
- Cameron, John R. and James G. Skofronick; Medical Physics. A Wiley-Interscience publication.
- Physics in Biology and Medicine, Paul Davidovits, Academic Press 3<sup>rd</sup> edition (2007)
- Medical Physics and Biomedical Engineering, B.H. Brown Taylor & Francis; 1<sup>st</sup> edition (1999)

### 3- Electronic Materials and Web Sites etc.

[www.en.wikipedia.org/](http://www.en.wikipedia.org/)

## X. Course Policies: (Based on the Uniform Students' By law (2007))

|   |                                                                                                                                                                                           |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <b>Class Attendance:</b><br>Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes. |
| 2 | <b>Tardiness:</b><br>A student will be considered late if he/she is not in class after 10 minutes of the start time of class.                                                             |
| 3 | <b>Exam Attendance/Punctuality:</b><br>No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not                                                     |



|   |                                                                                                                                                                                                                                                                                |
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|   | leave the hall before half of the exam time has passed.                                                                                                                                                                                                                        |
| 4 | <b>Assignments &amp; Projects:</b><br>Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.                                                                                         |
| 5 | <b>Cheating:</b><br>Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.                                        |
| 6 | <b>Forgery and Impersonation:</b><br>Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply. |
| 7 | <b>Other policies:</b><br>The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.                                     |