# Republic of Yemen

## Ministry of Higher Education & Scientific Research

Emirates International University

## Faculty of Dentistry

## Department of Basic science

## Doctor of Dental Surgery

# Course Specification of Biochemistry I

# Course No. ( )



Review committee:

Head of the Department

Quality Assurance head

Dean of Faculty

## I. Course Identification and General Information:

| | | | | | |
|---|---|---|---|---|---|
| 1 | **Course Title:** | Biochemistry I | | | |
| 2 | **Course Code & Number:** | | | | |
| 3 | **Credit Hours:** | **Credit Hours** | **Theory Hours** | | **Lab. Hours** |
| | | | **Lecture** | **Exercise** | |
| | | 3 | 2 | -- | 2 |
| 4 | **Study Level/ Semester at which this Course is offered:** | 1st Level / 2nd Semester | | | |
| 5 | **Pre –Requisite (if any):** | General chemistry | | | |
| 6 | **Co –Requisite (if any):** | None | | | |
| 7 | **Program (s) in which the Course is Offered:** | Doctor of Dental Surgery | | | |
| 8 | **Language of Teaching the Course:** | English | | | |
| 9 | **Study System:** | Semester based System | | | |
| 10 | **Mode of Delivery:** | Full Time | | | |
| 11 | **Location of Teaching the Course:** | Faculty of Dentistry | | | |
| 12 | **Prepared by:** | Dr. Waled Al-Dubai | | | |

## II. Course Description:

This course records an outline of the molecular mechanisms fundamental to the life processes. Biochemistry I covers many topics including, structure, composition, classification, and importance of carbohydrates. lipids, proteins, vitamins and enzymes that provides students with basic information of biochemistry that help in identification the causes of many diseases. the student should be able to recognize the concepts of pH and buffering and types of solutions and define the basic structures of the major biochemical components, to understand the way in which their structure is related to function.

| III. Course Intended Learning Outcomes (CILOs) Upon successful completion of the course, students will be able to: | | Referenced PILOs Learning out of program | | |
|---|---|---|---|---|
| **A. Knowledge and Understanding:** | | **I, A or E** | | |
| a1 | Elucidate the composition of carbohydrates, lipids, proteins, and their importance | I | A1 | Describe the scientific basis of dentistry and the relevant biomedical and behavioral sciences which form the basis for understanding human growth, development and health. |
| a2 | Classify carbohydrates, lipids, proteins, vitamins and enzymes. | I | A1 | Describe the scientific basis of dentistry and the relevant biomedical and behavioral sciences which form the basis for understanding human growth, development and health. |
| a3 | Enumerate the causes and symptoms of biomolecules deficiency | I | A2 | Explain the structure and function of the human body in health and disease related to the practice of dentistry. |
| | | | | |
| **B. Intellectual Skills:** | | | | |
| b1 | Analyze the causes, and symptoms of diseases based on knowledge of carbohydrate, protein ,lipid vitamins, and enzymes chemistry. | I | B1 | Incorporate theoretical basic biomedical, behavioral and dental sciences with the clinical signs and symptoms for appropriate understanding of disease and its management. |
| b2 | Interpret abnormal biochemical tests results and analyze source of lab errors | I | B2 | Apply critical thinking and evidence-based problem solving when providing patient's care. |
| **C. Professional and Practical Skills:** | | | | |

| | | | | |
|---|---|---|---|---|
| c1 | Select suitable tests used in biochemistry lab | I | C1 | Obtain and record a comprehensive history, perform an appropriate physical examination, and carry out different investigations to reach a correct diagnosis and treatment. |
| c2 | Perform biochemical tests to identify and differentiate between carbohydrates, lipids, and proteins | I | C1 | Obtain and record a comprehensive history, perform an appropriate physical examination, and carry out different investigations to reach a correct diagnosis and treatment. |
| c3 | Perform lab experiments with great caution to avoid the hazards of chemical on him and his colleagues | I | C3 | Apply infection control and radiation protection according to international standards. |
| | **D. Transferable Skills:** | | | |
| d1 | Use computer and internet to get information | | D2 | Use advanced information and communication technologies to enrich and diversify professional experience |
| d2 | Work effectively alone and as part of a team | | D3 | Demonstrate leadership and teamwork skills with colleagues and other oral health team for effective delivery of oral health care. |
| d3 | Demonstrate the skills required for self-learning to remain updated with dental practice. | | D1 | Commit to continuous education, self-development and lifelong learning to remain updated with advances in dental practice. |

**(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 | Elucidate the composition of carbohydrates, lipids, proteins, and their importance | Lectures<br>Presentation | -Quizzes<br>-Midterm Exam<br>-Final Exam |
| a2 | Classify carbohydrates, lipids, proteins, vitamins and enzymes. | Lectures<br>Presentation | -Quizzes<br>-Midterm Exam<br>-Final Exam |
| a3 | Enumerate the causes and symptoms of biomolecules deficiency | Lectures<br>Presentation | -Quiz<br>-Midterm Exam<br>-Final Exam |

**(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:**

| | Course Intended Learning Outcomes | Teaching Strategies | Assessment Strategies |
|---|---|---|---|
| b1 | Analyze the causes, and symptoms of diseases based on knowledge of carbohydrate, protein ,lipid vitamins, and enzymes chemistry. | -Lectures<br>- Discussion | -Quizzes<br>-Midterm Exam<br>-Final Exam |
| b2 | Interpret abnormal biochemical tests results and analyze source of lab errors | -Lectures<br>- Discussion | -Practical Exam |

**(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 | Select suitable tests used in biochemistry lab | -Lectures<br>-Lab Experiments | -Practical Exam |
| c2 | Perform biochemical tests to identify and differentiate between carbohydrates, lipids, and proteins | -Lectures<br>-Lab Experiments | - Direct observation<br>- Practical Exam |
| c3 | Perform lab experiments with great caution to avoid the hazards of chemical on him and his colleagues | -Lectures<br>-Lab Experiments | - Direct observation<br>- Practical Exam |

| (D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods: | | | |
|---|---|---|---|
| | **Course Intended Learning Outcomes** | **Teaching Strategies** | **Assessment Strategies** |
| d1 | Use computer and internet to get information | - Discussion<br>- Self Learning<br>- Presentation | Research<br>Homework<br>Group work<br>Direct observation |
| d2 | Work effectively alone and as part of a team | - Discussion<br>- Self Learning<br>- Presentation<br>- Seminars | Research<br>Homework<br>Group work<br>Direct observation |
| d3 | Demonstrate the skills required for self-learning to remain updated with dental practice. | - Discussion<br>- Self Learning<br>- Presentation<br>- Seminars | Research<br>Homework<br>Group work<br>Direct observation |

## IV. Course Contents:

### A. Theoretical Aspect:

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours | Learning Outcomes (CILOs) |
|---|---|---|---|---|---|
| 1 | **Carbohydrates Chemistry** | -Biochemistry and medicine<br>-Defenation and function of carbohydrates<br>Classification of carbohydrates<br>-Monosaccharides (classification, importance, properties)<br>-Disaccharides (types, importance, properties)<br>-Polysaccharides (classification, importance, properties) | 3 | 6 | a1,a2, a3<br>b1 |
| 2 | **Lipid chemistry** | -Classification of lipids<br>-Simple lipids and their importance<br>-Compound lipids | 3 | 6 | a1,a2, a3<br>b1 |

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours | Learning Outcomes (CILOs) |
|---|---|---|---|---|---|
| | | -Phospholipids (types, structure, importance)<br>-Lipoproteins (types, structure, importance)<br>-Derived lipids (types, structure, importance) | | | |
| 3 | **Midterm Exam** | -MCQs and essay questions | 1 | 2 | a1,a2, a3 b1 |
| 4 | **Protein chemistry** | -Definition and importance of proteins<br>-Aminoacids (classification , structure, properties, importance)<br>-Structure of proteins (primary, secondary, tertiary, quaternary)<br>-Classification of proteins with examples | 4 | 8 | a1,a2, a3 b1 |
| 5 | **Vitamins and Enzymes** | -Definition and classification of vitamins<br>-Fat soluble vitamins and Water soluble vitamins (sources, structure, active forms, absorption, storage, stability, functions, deficiency and clinical manifestation , toxicity).<br>-Definition and classification of enzymes<br>-Cofactors<br>-Mechanism of enzyme action<br>-Factors that affect the rate of enzyme action<br>-Enzymes inhibitors and isoenzymes<br>-Clinical application of enzymes | 4 | 8 | a2, a3 b1 |
| 6 | **Final Exam** | -MCQs and essay questions | 1 | 2 | a1,a2, a3 b1 |
| **Number of Weeks /and Units Per Semester** | | | **16** | **32** | |

**B. Case Studies and Practical Aspect:**

| No. | Tasks/ Experiments | Week Due | Contact Hours | Learning Outcomes (CILOs) |
|---|---|---|---|---|
| 1 | Introduction to lab safety | 3rd,4th* | 4 | c3 |
| 2 | -Identification of carbohydrates:<br>Molisch's test, Iodine test, Barfoed's test<br>Benedict's test, Seliwanoff's test<br>Carbohydrate scheme tests | 5th,6th,7th | 6 | b2,c1,c2,c3 |
| 3 | -Protein identification:<br>Biuret test, Isoelectricpoint test, Heat and acid tests Proteins Scheme tests. | 8th,9th,10th | 6 | b2,c1,c2,c3 |
| 4 | -Lipid identification tests:<br>Test for solubility, Suden IV, Salkowski reaction, Dichromate test | 11th,12th,13th | 6 | b2,c1,c2,c3 |
| 5 | - practical Exam | 15th | 2 | b2,c1,c2,c3 |
| **Number of Weeks /and Units Per Semester** | | **12** | **24** | |

## V. Teaching Strategies of the Course:

- Lectures
- Discussion
- Self-Learning
- Presentation
- Seminars
- Lab Experiments

## VI. Assessment Methods of the Course:

- Quizzes
- Midterm Exam
- Final Exam
- Practical Exam
- Research

- Homework
- Group work
- Direct observation

## VII. Assignments:

| No. | Assignments | Week Due | Mark | Aligned CILOs (symbols) |
|---|---|---|---|---|
| 1 | **Assignment :** Searching information about related subjects of biochemistry | 10th | 5 | d1,d2,d3 |
| **Total** | | | **5** | |

## 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** | 10th | 5 | 5 % | d1,d2,d3 |
| 2 | **Quizzes** | 4th | 5 | 5 % | a1,a2, a3 b1 |
| 3 | **Midterm Exam** | 7th | 20 | 20 % | a1,a2, a3 b1 |
| 4 | **Practical Exam** | 15th | 20 | 20 % | b2,c1,c2,c3 |
| 5 | **Final Exam** | 16th | 50 | 50 % | a1,a2, a3 b1 |
| **Total** | | | **100** | **100%** | |

## IX. Learning Resources:

**1- Required Textbook(s) ( maximum two ):**

1- Victor, R.W., David, A.B., Kathleen, M.B., Peter, j. k., Anthony, P.W (2012). Harper's Illustrated Biochemistry.29st edn. United States : McGraw-Hill Education

2- Al-Dubai W

| |
|---|
| 3- .Medical biochemistry (part 1). 2nd ed.Yemen:Dar Althakafa Al-asreeia |
| **2- Essential References:** |
| 1- -David, L. N., Michael, M. C (2013) Lehninger principles of biochemistry.6th edn. England: Macmillan Higher Education.<br>2- -Michael, L., Alisa, P (2014) Marks' Essentials of Medical Biochemistry: A Clinical Approach. 2nd edn. China: Wolters Kluwer. |
| **3- Electronic Materials and Web Sites etc.:** |
| **Websites:**<br>1- Biochemistry Courses<br>https://www.edx.org/learn/biochemistry<br>2- Biochemistry: Free For All<br>https://open.umn.edu/opentextbooks/textbooks/biochemistry-free-for-all-ahern |

| **X. Course Policies: (Based on the Uniform Students' By law (2007)** | |
|---|---|
| 1 | **Class Attendance:**<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 | **Tardiness:**<br>A student will be considered late if he/she is not in class after 10 minutes of the start time of class. |
| 3 | **Exam Attendance/Punctuality:**<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 | **Assignments & Projects:**<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 | **Cheating:**<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 | **Forgery and Impersonation:**<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 | **Other policies:**<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. |

# Faculty of Dentistry

## Department of Basic science

## Doctor of Dental Surgery

## Course Plan (Syllabus) of Biochemistry I

## Course No. ( )

| I. Information about Faculty Member Responsible for the Course: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Name of Faculty Member:** | **Waled Al-Dubai** | **Office Hours** | | | | | | |
| **Location& Telephone No.:** | **Sana'a 733872358** | **4 Hours Weekly** | | | | | | |
| | | **1** | **1** | | **1** | | **1** | |
| **E-mail:** | walidw2001@yahoo.com | SAT | SUN | MON | TUE | WED | THU | |

## II. Course Identification and General Information:

| | | | | | |
|---|---|---|---|---|---|
| 1 | **Course Title:** | Biochemistry I | | | |
| 2 | **Course Code & Number:** | | | | |
| 3 | **Credit Hours:** | **Credit Hours** | **Theory Hours** | | **Lab. Hours** |
| | | | **Lecture** | **Exercise** | |
| | | 3 | 2 | -- | 2 |
| 4 | **Study Level/ Semester at which this Course is offered:** | 1st Level / 2nd Semester | | | |
| 5 | **Pre –Requisite (if any):** | General chemistry | | | |
| 6 | **Co –Requisite (if any):** | None | | | |
| 7 | **Program (s) in which the Course is Offered:** | Doctor of Dental Surgery | | | |
| 8 | **Language of Teaching the Course:** | English | | | |
| 9 | **Study System:** | Semester based System | | | |
| 10 | **Mode of Delivery:** | Full Time | | | |
| 11 | **Location of Teaching the Course:** | Faculty of Dentistry | | | |
| 12 | **Prepared by:** | Dr. Waled Al-Dubai | | | |

## III. Course Description:

This course records an outline of the molecular mechanisms fundamental to the life processes. Biochemistry I covers many topics including, structure, composition, classification, and importance of carbohydrates. lipids, proteins, vitamins and enzymes that provides students with basic information of biochemistry that help in identification the causes of many diseases. the student should be able to recognize the concepts of pH and buffering and types of solutions and define the basic structures of the major biochemical components, to understand the way in which their structure is related to function.

## IV. Course Intended Learning Outcomes (CILOs) :

**Upon successful completion of the Course, student will be able to:**

| | |
|---|---|
| | **A. Knowledge and Understanding:** |
| a1 | Elucidate the composition of carbohydrates, lipids, proteins, and their importance |
| a2 | Classify carbohydrates, lipids, proteins, vitamins and enzymes. |
| a3 | Enumerate the causes and symptoms of biomolecules deficiency |
| | |
| | **B. Intellectual Skills:** |
| b1 | Analyze the causes, and symptoms of diseases based on knowledge of carbohydrate, protein ,lipid vitamins, and enzymes chemistry. |
| b2 | Interpret abnormal biochemical tests results and analyze source of lab errors |
| | **C. Professional and Practical Skills:** |
| c1 | Select suitable tests used in biochemistry lab |
| c2 | Perform biochemical tests to identify and differentiate between carbohydrates, lipids, and proteins |
| c3 | Perform lab experiments with great caution to avoid the hazards of chemical on him and his colleagues |
| | **D. Transferable Skills:** |
| d1 | Use computer and internet to get information |
| d2 | Work effectively alone and as part of a team |
| d3 | Demonstrate the skills required for self-learning to remain updated with dental practice. |

## V. Course Contents:

**A. Theoretical Aspect:**

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours |
|---|---|---|---|---|
| 1 | **Carbohydrates Chemistry** | -Biochemistry and medicine<br>-Defenation and function of carbohydrates | 3 | 6 |

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours |
|---|---|---|---|---|
| | | Classification of carbohydrates<br>-Monosaccharides (classification, importance, properties)<br>-Disaccharides (types, importance, properties)<br>-Polysaccharides (classification, importance, properties) | | |
| 2 | **Lipid chemistry** | -Classification of lipids<br>-Simple lipids and their importance<br>-Compound lipids<br>-Phospholipids (types, structure, importance)<br>-Lipoproteins (types, structure, importance)<br>-Derived lipids (types, structure, importance) | 3 | 6 |
| 3 | **Midterm Exam** | -MCQs and essay questions | 1 | 2 |
| 4 | **Protein chemistry** | -Definition and importance of proteins<br>-Aminoacids (classification , structure, properties, importance)<br>-Structure of proteins (primary, secondary, tertiary, quaternary)<br>-Classification of proteins with examples | 4 | 8 |
| 5 | **Vitamins and Enzymes** | -Definition and classification of vitamins<br>-Fat soluble vitamins and Water soluble vitamins (sources, structure, active forms, absorption, storage, stability, functions, deficiency and clinical manifestation , toxicity).<br>-Definition and classification of enzymes<br>-Cofactors<br>-Mechanism of enzyme action<br>-Factors that affect the rate of enzyme action<br>-Enzymes inhibitors and isoenzymes | 4 | 8 |

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours |
|---|---|---|---|---|
| | | -Clinical application of enzymes | | |
| 6 | **Final Exam** | -MCQs and essay questions | 1 | 2 |
| **Number of Weeks /and Units Per Semester** | | | **16** | **32** |

**B. Case Studies and Practical Aspect:**

| No. | Tasks/ Experiments | Week Due | Contact Hours |
|---|---|---|---|
| 1 | Introduction to lab safety | 3rd,4th* | 4 |
| 2 | -Identification of carbohydrates:<br>Molisch's test, Iodine test, Barfoed's test<br>Benedict's test, Seliwanoff's test<br>Carbohydrate scheme tests | 5th,6th,7th | 6 |
| 3 | -Protein identification:<br>Biuret test, Isoelectricpoint test, Heat and acid tests<br>Proteins Scheme tests. | 8th,9th,10th | 6 |
| 4 | -Lipid identification tests:<br>Test for solubility, Suden IV, Salkowski reaction, Dichromate test | 11th,12th,13th | 6 |
| 5 | - practical Exam | 15th | 2 |
| **Number of Weeks /and Units Per Semester** | | **12** | **24** |

## VI. Teaching Strategies of the Course:

- Lectures
- Discussion
- Self-Learning
- Presentation
- Seminars

- Lab Experiments

## VII. Assessment Methods of the Course:

- Quizzes
- Midterm Exam
- Final Exam
- Practical Exam
- Research
- Homework
- Group work
- Direct observation

## VIII. Assignments:

| No. | Assignments | Week Due | Mark |
|---|---|---|---|
| 1 | **Assignment :** Searching information about related subjects of biochemistry | 10th | 5 |
| **Total** | | | **5** |

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

| No. | Assessment Method | Week Due | Mark | Proportion of Final Assessment |
|---|---|---|---|---|
| 1 | **Assignments** | 10th | 5 | 5 % |
| 2 | **Quizzes** | 4th | 5 | 5 % |
| 3 | **Midterm Exam** | 7th | 20 | 20 % |
| 4 | **Practical Exam** | 15th | 20 | 20 % |
| 5 | **Final Exam** | 16th | 50 | 50 % |
| **Total** | | | **100** | **100%** |

## X. Learning Resources:

**1- Required Textbook(s) ( maximum two ):**

Victor, R.W., David, A.B., Kathleen, M.B., Peter, j. k., Anthony, P.W (2012). Harper's Illustrated Biochemistry.29st edn. United States : McGraw-Hill Education

Al-Dubai W

.Medical biochemistry (part 1). 2nd ed.Yemen:Dar Althakafa Al-asreeia

**2- Essential References:**

-David, L. N., Michael, M. C (2013) Lehninger principles of biochemistry.6th edn. England: Macmillan Higher Education.

-Michael, L., Alisa, P (2014) Marks' Essentials of Medical Biochemistry: A Clinical Approach. 2nd edn. China: Wolters Kluwer.

**3- Electronic Materials and Web Sites etc.:**

**Websites:**

Biochemistry Courses

https://www.edx.org/learn/biochemistry

Biochemistry: Free For All

https://open.umn.edu/opentextbooks/textbooks/biochemistry-free-for-all-ahern

## XI. Course Policies: (Based on the Uniform Students' Bylaw (2007)

| | |
|---|---|
| 1 | **Class Attendance:** 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 | **Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class. |
| 3 | **Exam Attendance/Punctuality:** 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 | **Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same. |
| 5 | **Cheating:** |

| | |
|---|---|
| | 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 | **Forgery and Impersonation:**<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 | **Other policies:**<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. |