|  |  |
| --- | --- |
| **Course Title:** | Biochemistry-2 |
| **Course Code:** | كيم-3285 |
| **Program:** | Bachelor of pharmacy |
| **Department:** | Biochemistry |
| **College:** | Pharmacy. |
| **Institution:** | Najran University |

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# A. Course Identification

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1. Credit hours:** | | | |  | | | | | | | | | | | | |
| **2. Course type** | | | | | | | | | | | | | | | | |
| **a.** | University | |  | | College | | | √ | Department | | | |  | Others |  |  |
| **b.** | | Required | | | | **√** | Elective | | |  |  | | | | | |
| **3. Level/year at which this course is offered:**  **Level-4 / 2nd years** | | | | | | | | | | | |  | | | | |
| **4. Pre-requisites for this course** (if any)**:**  **NA** | | | | | | | | | | | | | | | | |
| **5. Co-requisites for this course** (if any)**: NA** | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | |

## 6. Mode of Instruction (mark all that apply)

| **No** | **Mode of Instruction** | **Contact Hours** | **Percentage** |
| --- | --- | --- | --- |
| **1** | **Traditional classroom** | 30 | 100% |
| **2** | **Blended** |  |  |
| **3** | **E-learning** |  |  |
| **4** | **Correspondence** |  |  |
| **5** | **Other** |  |  |

**7. Actual Learning Hours** (based on academic semester)

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Learning Hours** |
| **Contact Hours** | | |
| **1** | **Lecture** | 30 |
| **2** | **Laboratory/Studio** | 30 |
| **3** | **Tutorial** |  |
| **4** | **Others** (specify) Examinations (theory and practical) |  |
|  | **Total** | 60 |
| **Other Learning Hours\*** | | |
| **1** | **Study** | 20 |
| **2** | **Assignments** | 5 |
| **3** | **Library** | 15 |
| **4** | **Projects/Research Essays/Theses** |  |
| **5** | **Others** (specify) |  |
|  | **Total** | 40 |

**\*** The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

# B. Course Objectives and Learning Outcomes

|  |
| --- |
| 1. Course Description ***The course covers basic concept and metabolic pathways of carbohydrates, lipids, amino acids, nucleotides and their abnormalities regarding health and disease state. It also covers the important practical session related to the different metabolic defect, and the methods of laboratory diagnosis of certain diseases related to metabolic pathways.*** |
|  |
| 2. Course Main Objective  * *Define the concept of metabolism* * *Understand the different metabolic pathways.* * *Describe the role of liver as the central metabolic organ.* * *Understand basic metabolic pathways regarding carbohydrates, lipids, protein and nucleotides.* * *Understand the basic metabolic abnormalities of the macromolecules mentioned above and their relationships to health and disease state.* * *Correlate between the practical session and the different metabolic pathways.* |
|  |

## 3. Course Learning Outcomes

| **CLOs** | | **Aligned****PLOs** |
| --- | --- | --- |
| 1 | **Knowledge:** |  |
| 1.1 | 1. *State the purpose of the metabolic pathways, the molecule (s) interring the pathway and product (s) of the pathway, regulated step (s), cofactors involved, the cellular location of the pathway and how pathways interact with each other.* 2. *Recognize the concepts of committed step, rate- limiting step and feedback and feed-forward regulation. Distinguish between anabolic and catabolic pathway.* 3. *Record the effect of various metabolic disorders on relevant biochemical pathways.* | K1 |
| 1.2 | 1. *Describe the general mechanisms for the regulation of metabolism* 2. *Name the metabolic functions of the liver, skeletal muscle and adipocytes and indicate the role of insulin, glucagon and epinephrine on metabolism.* 3. *Memories the biochemical function and properties of the plasma lipoproteins*   *Recall classical neurotransmitters. Describe their synthesis and catabolism.* | K1 |
| **2** | **Skills :** |  |
| 2.1 | *Evaluate some laboratory results& their clinical significance.* | .  S3 |
| 2.2 | *Relate some clinical condition to the defects of various metabolic pathways* |  |
| **3** | **Competence:** |  |
| 3.1 | *Develop the ability of searching and gathering of information.*  *Demonstrate ethical behavior & good professionalism* | C2 |
| 3.2 | *.* |  |

# 

# C. Course Content

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | Introduction to Metabolism | 2 |
| 2 | Citric acid cycle and Electron transport chain. | 2 |
| 3 | *Glycolysis* | 2 |
| 4 | *The Pentose Phosphate Pathway & Other Pathways of Hexose Metabolism* | 2 |
| 5 | *Gluconeogenesis & Control of the Blood Glucose* | 2 |
| 6 | *Glycogen metabolism* | 4 |
| 7 | *Lipids digestion and absorption* | 1 |
| 8 | *Fatty acid synthesis* | 2 |
| 9 | *Fatty acids oxidation and Ketogenesis* | 2 |
| 10 | *Cholesterol metabolism* | 2 |
| 11 | *Lipids transport and lipoproteins* | 2 |
| 12 | *Digestion and absorption of proteins* | 1 |
| 13 | *Catabolism of amino acids and transamination* | 2 |
| 14 | *Urea cycle* | 1 |
| 15 | *Heme metabolism& jaundice* | 2 |
| 16 | *Metabolism of xenobiotics* | 1 |
| 17 |  |  |
| 18 |  |  |
| 19 |  |  |
| 20 |  |  |
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# D. Teaching and Assessment

## 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| **Code** | **Course Learning Outcomes** | **Teaching Strategies** | **Assessment Methods** |
| --- | --- | --- | --- |
| **1.0** | **Knowledge** | | |
| 1.1 | ***By the end of the course the student is expected to:-***   1. *State the purpose of the metabolic pathways, the molecule (s) interring the pathway and product (s) of the pathway, regulated step (s), cofactors involved, the cellular location of the pathway and how pathways interact with each other.* 2. *Recognize the concepts of committed step, rate- limiting step and feedback and feed-forward regulation. Distinguish between anabolic and catabolic pathway.* 3. *Record the effect of various metabolic disorders on relevant biochemical pathways.* | * *Lectures* * *Assignment* * *Group discussion* | * *Written exam* * *Quizzes* * *Continuous evaluation* |
| 1.2 | 1. *Describe the general mechanisms for the regulation of metabolism* 2. *Name the metabolic functions of the liver, skeletal muscle and adipocytes and indicate the role of insulin, glucagon and epinephrine on metabolism.* 3. *Memories the biochemical function and properties of the plasma lipoproteins*   *Recall classical neurotransmitters. Describe their synthesis and catabolism.* |  |  |
| … |  |  |  |
| **2.0** | **Skills** | | |
| 2.1 | *By the end of this course students should:-*  *1. Understand the metabolism of different biomolecules*  *2. Correlates between the different metabolic pathways*  *1. Evaluate some laboratory results& their clinical significance.*  *2. Relate some clinical condition to the defects of various metabolic pathways* | * Group discussion * Demonstration * Practical Lectures | * Continuous evaluation. * Practical exam |
| 2.2 | *Evaluate some laboratory results& their clinical significance.* |  |  |
| … |  |  |  |
| **3.0** | **Competence** | | |
| 3.1 |  |  |  |
| 3.2 |  |  |  |
| … |  |  |  |

## 

## 2. Assessment Tasks for Students

| **#** | **Assessment task\*** | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | Quarterly Exam 1 | 6-7th | 15% |
| **2** | Quarterly Exam 1 | 10-11th | 15% |
| **3** | Assignments | 12th | 5% |
| **4** | Oral practical | 13th | 5 % |
| **5** | Final comprehensive practical exam | 15th | 20 % |
| **6** | Final comprehensive written exam | 16th | 40 % |
|  | TOTAL |  | 100 % |

**\*Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

# E. Student Academic Counseling and Support

|  |
| --- |
| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**   * 2 Office hours arranged to the time table * Student encourage to communicate on e-mail , social media or at office * Exam error analysis in class * Feedback for each student |
|  |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | 1. *Lippincott’s Reviews of Biochemistry, 5th  edition by Champe PC, Harvey RA, Ferrier DR, Lippincott William & Wilkins London, 2008* 2. *Harper's Illustrated Biochemistry: 28th Edition by Murray RK, Granner DK, Mayes PA, Rodwell VW, McGraw-Hill companies New York, 2009* |
| **Essential References Materials** | **Lectures handout.**  **Practical notebook** |
| **Electronic Materials** | *1. Saudi digital library.*  *2. Alsevier.* |
| **Other Learning Materials** | •Multimedia associated with the text books and the relevant websites  •Lecture notes |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**  (Classrooms, laboratories, demonstration rooms/labs, etc.) | * Lecture rooms * Laboratory |
| **Technology Resources**  (AV, data show, Smart Board, software, etc.) | * Data show and computer * Smart Board |
| **Other Resources**  (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | * **pH meter** * **Water bath** * **Various size tubes** * **Pipettes** * **Various chemical reagents necessary for laboratory experiments required to be performed by students in laboratory practical secessions** |

# G. Course Quality Evaluation

| **Evaluation**  **Areas/Issues** | **Evaluators** | **Evaluation Methods** |
| --- | --- | --- |
| Effectiveness of teaching and assessment | Students | Indirect (survey ) |
| Extent of achievement of course learning outcomes | Students | Indirect (survey ) |
| Program Leaders | Direct |
| Quality of learning resources | Students | Indirect (survey ) |
| Assessment Methods | Peer Reviewer | Direct |
|  |  |  |
|  |  |  |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

**Assessment Methods** (Direct, Indirect)

# H. Specification Approval Data

|  |  |
| --- | --- |
| **Council / Committee** |  |
| **Reference No.** |  |
| **Date** |  |