Program and Courses
Specifications for MD Biochemistry

CODE: MD04-BIO

Department of
Medical Biochemistry
Faculty of Medicine
Menoufia University
2010-2011
## Contents of MD Biochemistry

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### 1st Part Courses:
- Course specification of Molecular techniques of Biochemistry (BIO 811)
- Course specification of Biochemistry Instruments (optional course) (BIO 812)

### 2nd Part Courses:
- Course specification for Medical Biochemistry course (BIO 817)
- Course specification for Clinical Biochemistry optional course (BIO 818)

- Annex 1: Academic Reference standards For MD degree medical biochemistry
- Annex 2: Comparison between program ILOS & ARS
- Annex 3: Program – Course ILOs Matrix.
**PROGRAM Specification of M.D Medical Biochemistry**

Menoufia University
Faculty of Medicine
Medical Biochemistry department

**A- Administrative Information**

1. **Program Title**: M.D. Degree of Medical Biochemistry

2. **Award / degree**: M.D degree

3. **Type of the program**: Single

4. **Department responsible**: Medical Biochemistry department

5. **Coordinator**: Prof. Dr. Naglaa Mohamed Ghanayem
   Head of Medical Biochemistry Dept.

   **13- External Evaluator**: Prof. Dr/ Salwa El Meilegy

   Professor of Medical Biochemistry Faculty of medicine, Tanta University

6. **Date of program accreditation**: 11/2010

**B- Professional Information**

1. **Program Aims**:

The broad aims of the Program are as follows:

1. Provide students with a thorough background in modern biochemistry and molecular biology. This theoretical background provides the fundamental knowledge necessary for an understanding of the life sciences at the molecular level.

2. Found technical positions in academic and labs, pursued careers in teaching, science writing and editing, or have gone on to advanced studies for the M.D. Degree.
3. Provides basic training in the principles of biochemistry and molecular biology.

2-Intended Learning Outcomes (ILOs) for program

3. **Knowledge and Understanding**: 

   By the end of the program the candidate should be able to:

   **A1** Discuss precisely the detailed structure, function and metabolic pathways of carbohydrates, lipids, proteins, nucleotides and their micro-molecules and their regulatory mechanisms.

   **A2** Distinguish perfectly the updates in the related metabolic disorders and their clinical prints on biochemical and molecular basis

   **A3** Express the functions of hormones and micronutrients, their biochemical, clinical and laboratory importance and deficiency manifestations of each

   **A4** Justify how the principles of genetics underlie much of the basis of modern molecular biology.

   **A5** Contrast different methods of nucleic acid isolation, amplification, detection and discrimination..

   **A6** Discuss the function & synthesis of red blood cells and the biochemical basis of related diseases.

   **A7** Judge the advances in biochemical composition of cytoskeleton and the role of oncogenes in cancer.

   **A8** Explain basics, methodology, tools and ethics of scientific medical research

   **A9** Mention ethical medico legal principles relevant to the practice in the field of Biochemistry.

   **A10** Demonstrate measurements of quality assurance and quality improvement in Biochemistry education and practice.
B. Intellectual Skills:

By the end of the program the candidate should be able to:

B1) Judge perfectly the different Biochemical pathways, and indicate the site of error; if present.

B2) Suggest accurately the possible investigations needed for diagnosis.

B3) Compare properly the biochemical information from a variety of sources.

B4) Recommend laboratory reagents and instruments that could be used in biochemistry and molecular labs.

B5) Discuss the evidence based approaches taken in the various areas of biochemistry.

B6) Plan an independent piece of work (e.g. a project) within a supported framework.

B7) Solve problems of relevant situations related to Biochemistry.

C. Professional and Practical Skills:

By the end of the program the candidate should be able to:

C1) Handle and use of chemical agents safely, apply standard guidelines of chemist and environmental safety.

C2) Perform different basic and advanced laboratory techniques, e.g. chromatography, molecular biology, electrophoresis, RIA and ELISA.

C3) Perform basic competencies in a range of practical biochemical techniques including data collection, and analysis and interpretation of those data.

C4) Practice safely in a laboratory environment.

C5) Write competently and evaluate all forms of professional reports related to Biochemistry.

D. General and Transferable Skills:

By the end of the program the candidate should be able to:

D1) Communicate effectively and sensitively with patients, laboratory staff, colleagues and students.
D2) Use information technology to improve his practice.

D3) Work effectively with others as a member or leader of a professional group.

D4) Setup rules and parameters for self-evaluation & evaluating others.

3- Academic Standards:
for this program were compiled according to the general Academic Reference Standards provided by the national authority for quality assurance and accreditation of education (naqaae) for postgraduate programs (published on February 2009). This program ARS were approved by the faculty council on 19/9/2010 decree NO. 45/1/9/2010.

3b. Comparison between ARS and ILOS of the program (Annex 2).

4- Curriculum Structure and Contents
4.a- Program duration (credit hours): 60 hours
4.b- Program structure:
Candidates should fulfill a total of total 1620 teaching hours.

● 4.b.1: Number of teaching hours:

- **First part**: 6 credit hours, **Second part**: 30 credit hours, **logbook**: 9 credit hours, **Essay**: 15 credit hours.

5- Courses contributing to the program

**First part:**
- a- Compulsory courses: Molecular techniques of Biochemistry (BIO 811)

(15 weeks over a period of 6 months) Number of hour/week: 2 hour lecture 1 hour practical (3 credit hours)

- b- Optional courses: Biochemistry Instruments (BIO 816)

(15 weeks over a period of 6 months) Number of hour/week: 3 hour lecture (3 credit hours)

- c- Elective courses: None.
Second part:

a- Compulsory courses: Medical Biochemistry (BIO 817)

(45 weeks over a period of 18 months)
Number of hour/week: 6 hour lecture 5 hour seminar, 6 hour practical, 9 hour activities (26 credit hours)

b- Optional courses: Clinical Biochemistry (BIO 818)

(45 weeks over a period of 18 months)
Number of hour/week: 1 hour lecture 2 hour seminar 1 hour practical (4 credit hours)

c- Elective courses: None.

Program admission requirements

Registration to the M.D. Biochemistry Program requires:

I. General requirements:
A. Candidates should have: MSc. Degree in medical Biochemistry
B. Follow regulatory rules of Menoufia Faculty of Medicine.

II. Specific requirements:
Candidates graduated from Egyptian Universities should have at least "Good Rank" in their final MSc exam in Medical Biochemistry

Regulations for progression and Program completion

Duration of program is 4 semesters (2 years), starting from registration till acceptance of the thesis; divided to: First Part: (≥6 months=1 semester):

- Program related basic and clinical science
- At least six months after registration should pass before the student can ask for examination in the 1st part.
- Two sets of exams: 1st in April — 2nd in October
• For the student to pass the first part exam, a score of at least 60% in each curriculum is needed. Those who fail in one curriculum need to re-exam it only. After passing of the first part examination and at least one year before allowing to enter second part final examination.

Second Part: (≥18 months=3 semesters):

• Program related specialized science of Medical Biochemistry courses.
• The student should pass the first before asking for examination in the second part.
• Fulfillment of the requirements in each course as described in the template and registered in the log book is a prerequisite for candidates to be assessed and undertake part 1 and part 2 examinations; as following:
  Training courses, Conference attendance, Workshops, Seminars, Self education program
• Two sets of exams: 1st in April— 2nd in October.
• For the student to pass the second part exam, a score of at least 60% is needed
• 4 times of oral and practical exams are allowed before the student has to reattend the written exam.

1. Evaluation of program intended learning outcomes
   Evaluator Tool

1. Senior students Questionnaire
2. Alumni Questionnaire
3. Stakeholders (Employers) Questionnaire
4. External Evaluator(s) External Examiner(s) Reports

The Program specification should have attached to it all course specifications listed in the matrix.
We verify that all of the information required to deliver this program is contained in the above specification and will be implemented. All course specification for this program are in place.

**Program coordinator:**

**Name** Prof. Dr. Naglaa Mohamed Ghanayem

**Dean:** Prof. Dr. Abd El Khala Elsadany

**Head of Quality Assurance Unit:** Prof. Dr. Wafaa Zahran
COURSE SPECIFICATION of Molecular Techniques of Biochemistry

Administrative information
Course Title: Molecular Techniques of Biochemistry
Code: BIO 811
Department giving the course: Medical Biochemistry
Program on which the course is given: MD degree in Medical Biochemistry program
Department offering the program: Medical Biochemistry

Semester: 1st part

Date of specification: 2010
Credit hours: 3 hours

Professional information

1 – Overall aims of course:
Provide candidate with advanced knowledge in modern biochemistry and molecular biology necessary for an understanding of the life sciences at the molecular level in addition to advanced training in the principles of biochemistry and molecular biology techniques.

2 – Intended learning outcomes of course (ILOs)

A-Knowledge and Understanding:

A1) Define the structure, function of nucleotides and their regulatory mechanisms.
A2) Distinguish the single nucleotide polymorphism from other types of mutations.
A3) Express the functions of DNA and RNA

B- Intellectual Skills

B1) Interpret the methods of isolation of DNA and RNA.
B2) Apply the different nucleic acid techniques
B3) Analyze the application of detection and discrimination techniques in molecular biology.

C - Professional and Practical Skills
C1) Arrange laboratory reagents and instruments used in molecular biology lab.
C2) Practice amplification, detection and discrimination techniques
C3) Accurately interpret the results of the new methods of Microarray and in situ hybridization

D - General and Transferable Skills
D1) Confirm his experience in dealing with different kinds of problems.
D2) Prove the medical progress by in the advanced medical research studies.
D3) Participate in related scientific meetings.

3 - CONTENTS:

1. Principles of molecular biology
2. Nucleic acid Isolation
   - DNA isolation
   - RNA isolation
3. Nucleic acid techniques
4. Single nucleotide polymorphism
5. Amplification techniques
   - Different types of polymerase chain reaction
   - Ligase chain reaction
6. Detection techniques
7. Discrimination techniques
8. Microarray and in situ hybridization

Credit hours: 3 hours
Lecture: 2 practical: 1 total: 3 hours
<table>
<thead>
<tr>
<th>Topic</th>
<th>Hours for lectures</th>
<th>Hours for practical</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Principles of molecular biology</td>
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<tr>
<td>2. Nucleic acid Isolation</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>3. Nucleic acid techniques</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>4 Single nucleotide polymorphism</td>
<td>3</td>
<td>3</td>
<td>6</td>
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<tr>
<td>5. Amplification techniques</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>6. Detection techniques</td>
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</tr>
<tr>
<td>7. Discrimination techniques</td>
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<td>5</td>
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<tr>
<td>8- Microarray and in situ hybridization</td>
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<td>Total</td>
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<td>60</td>
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<tr>
<td>Total number of credit hours</td>
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<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

1 credit hour = 15 hours theoretical
1 credit hour = 30 hours practical

(4) Teaching methods:
  4.1: Lecture
  4.2: Practical class
  4.3: Small group discussion with case study and problem solving
  4.4: Tutorial
  4.5: Seminars
  4.6: Workshops

(5) Assessment methods:
  5.1: Written Examination for assessment of ILOs number A1, A2, A3, B1-B3
  5.2: Oral examination for assessment of ILOs number: A1, A2, A3, D1, D2, D3, B1.
  5.3: Practical examination for assessment of ILOs number C1, C2, C3, D1, B1-3.
  5.4: Log book for activities for assessment of: mainly for assessment of practical &
transferrable skills which are accepted through attending different conferences, thesis discussions, seminars, workshops, attending scientific lectures as well as self learning. 

5.5: The supervisor require certain lab tests or exam that are evaluated and signed by the supervisors in the log book (without marks).

5.6: seminars: the candidate should prepare and present at least one seminar in a topic related to the course and determined by the supervisors in front of the department staff (without marks).

(6)-Assessment schedule:
- after 6 month from MD registration (written, oral and practical exam with marks)

7)-Weighting of assessment:
- Written exam: 50%
- Practical exam: 25%
- Oral exam: 25%

Other types of assessment
- Log book required activities to go through 2nd part examination .

(8) References of the course:
Hand books:
- Medical biochemistry department (student book)

Text books:

Textbooks of Medical Biochemistry, 7th edition by Chatterjea MN. and Shinde R. JAYPEE BROTHERS. New Delhi, India, 2007.


Websites: http://www.medlib.iupui.edu/ref/biochem.htm
http://www.biology.arizona.edu/default.html
Harvard Department of Molecular & Cellular Biology Links:
http://mcb.harvard.edu/BioLinks.html

(9) Facilities and resources mandatory for course completion:

Lecture rooms: available in the department

Laboratories: The Department has 3 laboratories for research with a wide range of instrumentation that is available for training and research.

library

- We certify that all of the information required to deliver this course is contained in the above specification and will be implemented

Course coordinator: Name: Prof. Dr. Naglaa Mohamed Ghanayem
Head of Department of Medical Biochemistry

Name: Prof. Dr. Naglaa Mohamed Ghanayem
COURSE SPECIFICATION of Biochemistry Instruments

A - Administrative information

Course Title: Techniques of Biochemistry

Code: BIO 816

Department giving the course: Medical Biochemistry

Program on which the course is given: MD degree in Medical Biochemistry program

Department offering the program: Medical Biochemistry

Semester: 1st part

Date of specification: 2010

Credit hours: 3 hours

A - Professional information

1 – Overall aims of course:

Provide candidate with advanced knowledge in modern biochemistry and molecular biology necessary for an understanding of the life sciences at the molecular level in addition to advanced training in the principles of biochemistry and molecular biology techniques.

2 – Intended learning outcomes of course (ILOs)

A - Knowledge and Understanding

A1) Mention the functions of spectrophotometer

A2) Illustrate the mode of action of light emission and scattering techniques

A3) Identify the basics principles of radioactivity..

A4) Describe how chromatography and Mass spectrometry used.

A5) Explain the role of electrophoresis in detection of different proteins and nucleic acids.
B-Intellectual Skills

B1) Interpret the different immunological techniques

B2) Correlate the automation with the advance in clinical biochemistry

B3) Compare the nanotechnology with the others

C-Professional and Practical Skills

C1) Perform molecular biology techniques: DNA extraction, agarose gel electrophoresis and PCR.

C2) Apply cellulose acetate electrophoresis and polyacrylamide gel electrophoresis for separation of plasma proteins.

C3) Handle and use chemical agents carefully and safely on community and environment as a part of the standard guidelines of chemist and environmental safety.

D-General and Transferable Skills

D1) Evaluate with experience any problem in front of him.

D2) Participate in the medical progress by having the basis of advanced medical research studies.

CONTENTS

1. Spectrophotometric techniques
2. Light emission and scattering techniques.
3. Basic principles of radioactivity and its measurement.
4. Electrophoresis.
   - Theory of electrophoresis
   - Conventional electrophoresis
   - Capillary electrophoresis
   - Microchip electrophoresis
5. Chromatography and Mass spectrometry
   o Separation mechanisms
   o Planar chromatography
6. Immunological techniques
- Basic concept
- Antigen-antibody binding
- Qualitative and quantitative methods

7 Automation in the clinical laboratory

8 Nanotechnology

Contents

Credit hours: 3 hours

Lecture: 2 practical: 1 total: 3

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<th>Topic</th>
<th>Hours for lectures</th>
<th>Hours for practical</th>
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<tr>
<td>1. Spectrophotometric techniques</td>
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<td>8</td>
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<tr>
<td>2. Light emission and scattering techniques.</td>
<td>4</td>
<td>4</td>
<td>8</td>
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<tr>
<td>3. Basic principles of radioactivity and its measurement.</td>
<td>4</td>
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<tr>
<td>4. Electrophoresis.</td>
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<tr>
<td>5. Chromatography and Mass spectrometry</td>
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<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6. Immunological techniques</td>
<td>4</td>
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1 credit hour = 30 hours practical

(4) Teaching methods:
4.1: Lecture
4.2: Practical class
4.3: Small group discussion with case study and problem solving
4.4: Tutorial
4.5: Seminars
4.6: Workshops

(5) Assessment methods:
5.1: Written Examination for assessment of ILOs number A1, A2, A3, A4, A5, B1-B3
5.3: Practical examination for assessment of ILOs number C1, C2, C3, D1, B1-3.
5.4: Log book for activities for assessment of: mainly for assessment of practical & transferrable skills which are accepted through attending different conferences, thesis discussions, seminars, workshops, attending scientific lectures as well as self learning.
5.5: The supervisor require certain lab tests or exam that are evaluated and signed by the supervisors in the log book (without marks).
5.6: Seminars: the candidate should prepare and present at least one seminar in a topic related to the course and determined by the supervisors in front of the department staff (without
marks).

(6)-Assessment schedule:
- after 6 month from MD registration (written, oral and practical exam with marks)

(7) Weighting of assessment
- Written exam: 50%
- Practical exam: 25%
- Oral exam: 25%

(8) References of the course:
Hand books:
  - Medical biochemistry department (student book)
Text books:
  - Lippincott's Reviews of Biochemistry, 4th edition by Champe PC, Harvey RA, Ferrier DR,
  - Textbooks of Medical Biochemistry, 7th edition by Chatterjea MN. and Shinde R.
    JAYPEE BROTHERS. New Delhi, India, 2007.
  - New York 2002
Websites: http://www.medlib.iupui.edu/ref/biochem.htm
  - The Biology Project (from the University of Arizona): http://www.biology.arizona.edu/default.html
  - Harvard Department of Molecular & Cellular Biology Links: http://mcb.harvard.edu/BioLinks.html

(8) Facilities and resources mandatory for course completion:
- Lecture rooms: available in the department
- Laboratories: The Department has 3 laboratories for research with a wide range of instrumentation that is available for training and research.
- Library
8- We certify that all of the information required to deliver this course is contained in the above specification and will be implemented

Course coordinator:
Name: Prof. Dr. Naglaa Mohamed Ghanayem
Head of Department: Medical Biochemistry
Name: Prof. Dr. Naglaa Mohamed Ghanayem

COURSE SPECIFICATION of Medical Biochemistry

(A) Administrative information

Course Title: Medical Biochemistry
Code: BIO 817
Department giving the course: Medical Biochemistry
Program on which the course is given: MD degree in Medical Biochemistry program
Department offering the program: Medical Biochemistry

Semester: 2nd part

Date of specification: 2010

Credit hours: 26 hours

(B) Professional information

1 – Overall aims of course:
Provide candidate with advanced knowledge in modern biochemistry and molecular biology necessary for an understanding of the life sciences at the molecular level in addition to advanced training in the principles of biochemistry and molecular biology techniques.

2 – Intended learning outcomes of course (ILOs)

A- Knowledge and Understanding:
By the end of the program the candidate should be able to:
A1. Demonstrate the chemical structure and properties of the major metabolites.
A2. Demonstrate different metabolic pathways and the related errors.
A4. Relate biochemistry to extracellular matrix component, immunoglobulin, cancer, oncogenes, red and white blood cells.
A5. Demonstrate the principles of genetics basis of modern molecular biology.
A6. Contrast important biochemical importance of vitamins, minerals and hormones
A7. Explain basics, methodology, tools and ethics of scientific medical research
A8. Mention ethical medico legal principles relevant to the practice in the field of Biochemistry.

B. Intellectual Skills:
By the end of the program the candidate should be able to:
B1. Evaluate the different Biochemical pathways, and indicate the site of error; if present.
B2. Suggest the possible investigations needed for diagnosis.
B3. compare the biochemical information from a variety of sources.
B4. Plan an independent piece of work (e.g. a project) within a supported framework.
B5. make basic strategies that enable them to update their knowledge of biochemistry.
B6. Appreciate the different approaches taken in the various areas of biochemistry.

C. Professional and Practical Skills:
By the end of the program the candidate should be able to:
C1. Practice basic competencies in a range of practical biochemical techniques including data collection, and analysis and interpretation of those data.
C2. Practice safely in a laboratory environment, manage time effectively.
C3. Use basic and advanced laboratory equipments in different techniques.
C4. Write competently and evaluate all forms of professional reports related to Biochemistry.

D. General and Transferable Skills:
By the end of the program the candidate should be able to:
D1. Plan and make a decision.
D2. Communicate ideas and experiments clearly to others.
D3. Appreciate the value of different approaches.
D4. Modify the interpersonal skills that will allow them to participate in co-operative group
D5. Recognize the applicability of biochemistry to their progressing careers.

Content

1- Basic Biochemistry courses

2- Bioenergetics and metabolism of CHO and lipids
   a- Bioenergetics, Biologic oxidation, respiratory chains and oxidative phosphorylations
   b- Dietary carbohydrates, digestion and absorption, pathways of glucose oxidation,
glycogen metabolism, gluconeogenesis, special metabolism of fructose, galactose and
aminosugars, pathological aspects of carbohydrate metabolism and their clinical
implications with special emphasis on diabetes mellitus and biochemistry of insulin and
other disorders of carbohydrate metabolism and their clinical importance.
   c. Dietary lipids, digestion and absorption, metabolism of triacylglycerol, fatty acid
metabolism, metabolism of: eicosanoids, conjugated lipids, cholesterol, ketone bodies,
classification and disorders of plasma lipoproteins. Pathological aspects of lipid
metabolism and their clinical implications.

3- Metabolism of proteins and amino acids
Dietary proteins, digestion and absorption, general aspect of protein metabolism,
metabolism of ammonia, metabolism of individual amino acids with related errors of
metabolism, pathological aspects of protein and amino acid metabolism and their clinical
implications.

4- Minerals, body fluids and tissues structures
Composition of milk, blood, CSF, sweat seminal fluid and urine in health and disease.
Blood plasma, clinical importance of plasma enzymes and proteins. Biochemical aspects
of coagulation.
5- Nutrition, digestions and absorption
6- Hormones

7- Cancer and oncogenes
8- Nucleotides metabolism
9- Molecular biology
   a- Nucleic acid structure and functions, DNA organizations, replication and repair, RNA synthesis, Processing and Modifications
   b- Protein synthesis and genetic code
   c- Regulations of gene expression
   d- Molecular genetics, recombinant DNA and genomic technology.

10- Vitamins and minerals
11- The extracellular matrix, muscle, cytoskeletons and glycoproteins
12- Immunoglobulins, red and white blood cells
13- Metabolism of Xenobiotics
14- The human genome project
15- Seminars
   o Piwi RNA
   o Mechanisms of suppression
   o Epigenetics
   o Gene therapy
   o Stem cell
   o Post transcription control of gene expression
   o RNA editing
   o Cytochrome P 450

16- Practical and clinical training program (Clinical Biochemistry)
1- blood collection
2- Methods of determination and clinical relevance of different parameters in body fluids.
.3- Methods and clinical relevance of enzymes in serum and plasma.

**Contents**

**Credit hours**: 26 hours

Lectures: 5  practical: 3.5  seminar: 8  log: 9.5

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<thead>
<tr>
<th>Topic</th>
<th>Hours for lectures</th>
<th>Hours for practical</th>
<th>Hours for log activities</th>
<th>Hours for seminar</th>
<th>No. of hours per week</th>
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<tbody>
<tr>
<td>1- Basic Biochemistry courses</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>26 (3 week)</td>
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<tr>
<td>2- Bioenergetics and metabolism of CHO and lipids</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>26 (3 week)</td>
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<tr>
<td>3- Metabolism of proteins and amino acids</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>26 (3 weeks)</td>
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<td>4- Minerals, body fluids and tissues structures</td>
<td>6</td>
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<td>9</td>
<td>5</td>
<td>26 (2 week)</td>
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<td>5- Nutrition, digestions and absorption</td>
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<td>6</td>
<td>9</td>
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<td>26 (2 week)</td>
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<td>6- Hormones</td>
<td>5</td>
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<td>9</td>
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<td>7- Cancer and oncogenes</td>
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<td>8- Nucleotides metabolism</td>
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<td>9- Molecular biology</td>
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<td>10- Vitamins and minerals</td>
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<td>11- The extracellular matrix, muscle, cytoskeletons and glycoproteins</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>5</td>
<td>26 (1 week)</td>
</tr>
<tr>
<td>12- Immunoglobulins, red and white blood cells</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>26 (1 week)</td>
</tr>
<tr>
<td>Course Description</td>
<td>Weeks 1</td>
<td>Weeks 2</td>
<td>Weeks 3</td>
<td>Weeks 4</td>
<td>Total</td>
</tr>
<tr>
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</tr>
<tr>
<td>Metabolism of Xenobiotics</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>5</td>
<td>26 (1 week)</td>
</tr>
<tr>
<td>The Human Genome Project</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>26 (6 weeks)</td>
</tr>
<tr>
<td>Seminars</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>5</td>
<td>26 (3 weeks)</td>
</tr>
<tr>
<td>Practical and Clinical Training Program</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>26 (3 weeks)</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>5</td>
<td>9</td>
<td>12</td>
<td>26 (2 weeks)</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>17</td>
<td>9</td>
<td>-</td>
<td>26 (2 weeks)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>76</td>
<td>106</td>
<td>144</td>
<td>90</td>
<td>26</td>
</tr>
</tbody>
</table>

1 credit hour = 15 hours theoretical
1 credit hour = 30 hours practical

(3) Teaching methods:

web site : www.mfm2015.com   Tel : 048/2222731 - 048/2317508   Fax : 048/2317502 - 048/2317508
4.1: Lecture
4.2: Practical class
4.3: Small group discussion with case study and problem solving
4.4: Tutorial  4.5: Seminars  4.6: Workshops

(4) Assessment methods:
5.1: Written Examination for assessment of ILOs number A1, A2, A3, A4, A5, A6, B1-B6
5.3: Practical examination for assessment of ILOs number C1, C2, C3, D1, B1-6.
5.4: Log book for activities for assessment of: mainly for assessment of practical & transferable skills which are accepted through attending different conferences, thesis discussions, seminars, workshops, attending scientific lectures as well as self-learning.
5.5: The supervisors require certain lab tests or exam that are evaluated and signed by the supervisors in the logbook (without marks).
5.6: seminars: the candidate should prepare and present at least one seminar in a topic related to the course and determined by the supervisors in front of the department staff (without marks).

(5)-Assessment schedule:
- after 18 month from success in first part of MD registration (written, oral and practical exam with marks)

(6)-Weighting of assessment
- Written exam: 50%
- Practical exam: 25%
- Oral exam: 25%

Other types of assessment
- Log book required activities to go through 2nd part examination.

(7) References of the course:
Hand books:
- Medical biochemistry department (student book)
Text books:
6
- Textbooks of Medical Biochemistry, 7th edition by Chatterjea MN. and Shinde R.
Facilities and resources mandatory for course completion:

Lecture rooms: available in the department
Laboratories: The Department has 3 laboratories for research with a wide range of instrumentation that is available for training and research.
library

8- We certify that all of the information required to deliver this course is contained in the above specification and will be implemented

Course coordinator:

Name Prof. Dr. Naglaa Mohamed Ghanayem

Head of Department of Medical Biochemistry

Name Prof. Dr. Naglaa Mohamed Ghanayem
COURSE SPECIFICATION of Clinical Biochemistry

A - Administrative information
Course Title: Clinical Biochemistry

Code: BIO 818
Department giving the course: Medical Biochemistry
Program on which the course is given: MD degree in Medical Biochemistry.
Department offering the program: Medical Biochemistry

Semester: 2nd part

Date of specification: 2010
Credit hours: 4 hours

(B) Professional information
1 – Overall aims of course:
Provide candidate with advanced knowledge in modern biochemistry and molecular biology necessary for an understanding of the life sciences at the molecular level in addition to advanced training in the principles of biochemistry and molecular biology techniques.

2 – Intended learning outcomes of course (ILOs)
A - Knowledge and Understanding

A1 Differentiate between the genetic defect in Xeroderma pigmentosa, sickle cell disease and Thalassemia.
A2 Identify the biochemical basis of obesity and osteoprosis (primary post-menopausal).
A3 Describe the biochemical and molecular basis of Alzheimer disease, cholera, colorectal cancer, cystic fibrosis, Duchene muscular dystrophy and hereditary hemochromatosis.
A4 Explain the role of Oncogenes in development of cancer.
**B-Intellectual Skills**

**B1** Interpret symptoms, signs and biochemical laboratory findings of type II diabetes mellitus, starvation, cirrhosis, diabetes insipidus, Acromegaly and Addison disease.

**B2** Interpret the laboratory investigation in kwashiorkor and marasmus as two types of malnutrition.

**C-Professional and Practical Skills**

**C1** Select the proper confirmatory tests for hormonal defects based on symptoms and signs.

**C2** Estimate the risks of handling and use of chemical agents on community and environment as a part of the standard guidelines of chemist and environmental safety.

**D-General and Transferable Skills**

**D1** plan with experience how to deal with any problem.

**D2** Participate in the medical progress by having the basis of medical research studies.

**Contents**

1) Red blood cells related genetic defect:

a- Sickle cell disease.

b- Thalassemia.

2) Oncogenes and cancer

3) Nutritional diseases:

a- Obesity.

b- Kwashiorkor as one type of protein energy malnutrition disease

c- Starvation
d- Marasmus

4) The genetic basis of some diseases:

a- Alzheimer, Duchene muscular dystrophy and cystic fibrosis.

b- Xeroderma Pigmentosa, hereditary hemochromatosis, cholera and colorectal cancer.

5) Diseases related to hormonal defect

a. Diabetes insipidus.

b- Hypothyroidism

c- Acromegaly.

d- Hyperthyroidism

e- Addison disease.

f- Type II diabetes

g- Hypoparathyroidism

6) The Cytoskeleton and osteoporosis

7) Liver cirrhosis

Contents

Credit hours: 4 hours
Lectures and seminars: 3 practical: 1

<table>
<thead>
<tr>
<th>Topic</th>
<th>Hours for lectures and seminars</th>
<th>Hours for practical</th>
<th>total</th>
</tr>
</thead>
<tbody>
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<td>1. Red blood cells related genetic defect</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------</td>
<td>------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Credits</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td>Total credit hours</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

1 credit hour = 15 hours theoretical
1 credit hour = 30 hours practical

(4) Teaching methods:
4.1: Lecture
4.2: Practical class
4.3: Small group discussion with case study and problem solving
4.4: Tutorial
4.5: Seminars
4.6: Workshops

(5) Assessment methods:
5.1: Written Examination for assessment of ILOs number A1,A2, A3, A4, B1-2, C1
5.2: Oral examination for assessment of ILOs number: A1,A2, A3, A4, ,D1,D2, ,B1.
5.3: Practical examination for assessment of ILOs number C1,C2 , D1,B1-2.
5.4: Log book for activities for assessment of : mainly for assessment of practical &
transferrable skills which are accepted through attending different conferences, thesis discussions, seminars, workshops, attending scientific lectures as well as self learning.

5.5: The supervisor require certain lab tests or exam that are evaluated and signed by the supervisors in the log book (without marks).

5.6: seminars: the candidate should prepare and present at least one seminar in a topic related to the course and determined by the supervisors in front of the department staff (without marks).

Assessment schedule:

- after 6 month from MD registration (written, oral and practical exam with marks)

(6)- Percentage of each Assessment to the total mark:

- Written exam: 50%
- Practical exam: 25%
- Oral exam: 25%

(7)- References of the course:

Hand books:
- Medical biochemistry department (student book)

Text books:

6

- Textbooks of Medical Biochemistry, 7th edition by Chatterjea MN. and Shinde R. JAYPEE BROTHERS. New Delhi, India, 2007.

Websites: http://www.medlib.iupui.edu/ref/biochem.htm

The Biology Project (from the University of Arizona):
(8) Facilities and resources mandatory for course completion:

Lecture rooms: available in the department
Laboratories: The Department has 3 laboratories for research with a wide range of instrumentation that is available for training and research.
library

8- We certify that all of the information required to deliver this course is contained in the above specification and will be implemented

**Course coordinator:**

Name  Prof. Dr. Naglaa Mohamed Ghanayem

Head of Department of Medical Biochemistry

Name  Prof. Dr. Naglaa Mohamed Ghanayem
Attributes of the graduate:

All degree programs offered by the Department of Medical biochemistry have the following general aims consonant with the University of Sheffield’s Mission Statement:

1. to provide teaching in the molecular biosciences that is informed and inspired by the research and scholarship of the staff, and is stimulating, useful and enjoyable to students;
2. to provide a broad understanding of the molecular biosciences together with more detailed and critical knowledge in selected areas;
3. to equip graduates with well-developed practical, analytical, communication, IT and problem-solving skills;
4. to provide all students with the opportunity to carry out laboratory-based project work, to develop their practical skills and to allow them to assess their ability and interest in laboratory work;
5. to provide a stimulating educational experience that prepares students for future employment and is orientated towards a professional career in the molecular biosciences;
6. to assess students over a range of skills and identify and encourage academic excellence;
7. to give students the opportunity to obtain feedback on their progress;
8. to provide a supportive environment for students;
9. to provide for diverse and developing student interests and aspirations by offering a choice of modules and project work within programs and allowing transfers between the various programs in the molecular biosciences offered by the Department;
10. to engender in students a desire for continuing professional development;
11. to encourage students to become informed citizens and understand the place of the molecular biosciences in society.

The specific aims of the M.D degree in Medical Biochemistry are:

1. to provide a broad understanding of biochemistry together with more detailed and critical knowledge in areas of the subject relevant to medicine.
2. provide an extended laboratory-based research project in a university or industrial environment;
3. provide additional training in research skills

**Intended learning outcomes**

**By the end of the course, students will have acquired**

- **A1** a broad-based core knowledge and understanding of the molecular biosciences, including biochemistry, genetics, microbiology, molecular biology and cell biology;
- **A2** detailed and critical knowledge, including knowledge of the most recent advances, in areas of biochemistry relevant to medicine;
- **A3** practical understanding of the nature of scientific knowledge, and of techniques and tools used in the area of Biochemistry.
- **A4** additional knowledge of research ethics, developments through attendance at the departmental research seminar program;
- **A5** the principles of quality assurance in medical practice.
- **A6** the ethical medico legal principles relevant to the practice in the field of Biochemistry.

**Thinking skills:**

by the end of the course, students will have acquired:

- **B1** Argue, and discuss medical issues on evidence based manner.
- **B2** Solve medical problems related to his specialty.
**B3** Formulate hypotheses and design experiments to test these hypotheses effectively, including the design of appropriate controls;

**Subject- based practical skills:**
C1 Use of relevant laboratory equipment and the ability to master, with appropriate training, new experimental techniques;

C2 Analyse and critically evaluate experimental data;

C3 write and evaluate a professional medical report related to his specialty

C4 Use recent technological tools to serve his career

**Skills for life and work (general skills):**

D1 Work effectively as a member of a team.

D2 Communicate effectively by all types of effective communication

D3 Use computer and IT efficiently to serve career development.

D4 Evaluate
Comparison between ARS& program ILOS

<table>
<thead>
<tr>
<th>ILOS</th>
<th>ARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2 Distinguish perfectly the updates in</td>
<td>A1 - A broad-based core knowledge and understanding of the molecular</td>
</tr>
<tr>
<td>the related metabolic disorders and their</td>
<td>biosciences, including biochemistry, genetics, microbiology,</td>
</tr>
<tr>
<td>clinical prints on biochemical and</td>
<td>molecular biology and cell biology;</td>
</tr>
<tr>
<td>molecular basis</td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>A4 Justify how the principles of genetics</td>
<td></td>
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<tr>
<td>of genetics underlie much of the basis of</td>
<td></td>
</tr>
<tr>
<td>the basis of modern molecular biology.</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>A7 Judge the advances in biochemical</td>
<td>A2 - Detailed and critical knowledge, including knowledge of the</td>
</tr>
<tr>
<td>composition of cytoskeleton and the role</td>
<td>most recent advances, in areas of biochemistry relevant to medicine;</td>
</tr>
<tr>
<td>of oncogenes in cancer.</td>
<td></td>
</tr>
<tr>
<td>A6 Discuss the function &amp; synthesis of</td>
<td></td>
</tr>
<tr>
<td>red blood cells and the biochemical basis</td>
<td></td>
</tr>
<tr>
<td>of related diseases.</td>
<td></td>
</tr>
<tr>
<td>A3 Express the functions of hormones and</td>
<td></td>
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<tr>
<td>micronutrients, their</td>
<td></td>
</tr>
<tr>
<td>A5 Contrast different methods of nucleic acid isolation, amplification, detection and discrimination.</td>
<td>A3-Practical understanding of the nature of scientific knowledge, and of techniques and tools used in the area of Biochemistry.</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>A8 Explain basics, methodology, tools and ethics of scientific medical research</td>
<td>A4 additional knowledge of research ethics, developments through attendance at the departmental research seminar program;</td>
</tr>
<tr>
<td>A10 Demonstrate measurements of quality assurance and quality improvement in Biochemistry education and practice</td>
<td>a5 the principles of quality assurance in medical practice.</td>
</tr>
<tr>
<td>A9 Mention ethical medico legal principles relevant to the practice in the field of</td>
<td>a6 the ethical medico legal principles relevant to the practice in the field of Biochemistry.</td>
</tr>
<tr>
<td>Biochemistry.</td>
<td>B5 Discuss the evidence based approaches taken in the various areas of biochemistry.</td>
</tr>
<tr>
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</tr>
<tr>
<td>B1 Argue, and discuss medical issues on evidence based manner.</td>
<td></td>
</tr>
<tr>
<td>B7 Solve problems of relevant situations related to Biochemistry.</td>
<td>B2 Solve medical problems related to his specialty.</td>
</tr>
<tr>
<td>B3 Formulate hypotheses and design experiments to test these hypotheses effectively, including the design of appropriate controls;</td>
<td></td>
</tr>
<tr>
<td>B6 Plan an independent piece of work (e.g. a project) within a supported framework</td>
<td></td>
</tr>
<tr>
<td>C1 Use safely relevant laboratory equipment and master, appropriate training, new experimental techniques;</td>
<td></td>
</tr>
<tr>
<td>C1 Handle and use of chemical agents safely, apply standard guidelines of chemist and environmental safety.</td>
<td></td>
</tr>
<tr>
<td>C2 Perform different basic and advanced laboratory techniques, e.g. chromatography, molecular biology, electrophoresis, RIA and ELISA.</td>
<td></td>
</tr>
<tr>
<td>C2 Analyse and critically evaluate experimental data;</td>
<td></td>
</tr>
<tr>
<td>C3 Perform basic competencies in a range of practical biochemical techniques including data collection, and analysis and interpretation of those data</td>
<td></td>
</tr>
<tr>
<td>C5 Write competently and evaluate all forms of professional reports related to Biochemistry.</td>
<td>C3 write and evaluate a professional medical report related to his specialty;</td>
</tr>
<tr>
<td>C5 Write competently and evaluate all forms of professional reports related to Biochemistry.</td>
<td></td>
</tr>
<tr>
<td>C2 Perform different basic and advanced laboratory techniques, e.g. chromatography, molecular biology, electrophoresis, RIA</td>
<td>C4 Use recent technological tools to serve his career</td>
</tr>
<tr>
<td>D3 Work effectively with others as a member or leader of a professional group.</td>
<td>D1 Work effectively as a member of a team.</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>D1- Communicate effectively and sensitively with patients, laboratory staff, colleagues and students.</strong></td>
<td><strong>D2 Communicate effectively by all types of effective communication</strong></td>
</tr>
<tr>
<td><strong>D2- Use information technology to improve his practice.</strong></td>
<td><strong>D3 Use computer and IT efficiently to serve career development.</strong></td>
</tr>
<tr>
<td><strong>D4 Setup rules and parameters for self-evaluation &amp; evaluating others</strong></td>
<td><strong>D4 Evaluate self and others</strong></td>
</tr>
</tbody>
</table>
### Annex 3: Program – Course ILOs Matrix

| Course                                                   | a1 | a2 | a3 | a4 | a5 | a6 | A8 | A9 | A1 | A0 | b1 | b2 | b3 | b4 | b5 | b6 | B7 | c1 | c2 | c3 | c4 | C5 | d1 | d2 | d3 | D4 |
|----------------------------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| **First part:**                                          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 1 - Basic Medical Science (Medical Biochemistry) : (BIO 811) | *  | *  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| **Second part:**                                         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 1 - Compulsory courses: in Medical Biochemistry (BIO 817) | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | *  |
| 2 - Elective courses: in Medical Biochemistry (BIO 818)   | *  | *  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |