KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
UNIVERSITAS BRAWIJAYA
FAKULTAS KEDOKTERAN
PROGRAM MAGISTER ILMU BIOMEDIK
Jalan Veteran, Malang 65145, Jawa Timur – Indonesia
Telp. (62)(341) 569117; 567192 Pes. 134, 135 – Fax. (62)(341) 564755
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# Teaching Plan

**Course Title** : **Medical Biochemistry**
**Course Code** : **DKF6106**
**Credits** : **2**
**Course Coordinator** : **dr. Hidayat Sujuti, Ph.D., Sp.M.**
**(Phone: 081330535061, email: hidayatsujuti@gmail.com)**

## Course Description

This course was designed with overall goal is to introduce students to the important concepts and principles of Biochemistry. The key objective is to understand and apply concepts and principles rather than merely memorize information. Subject areas covered include: the mechanism of biochemistry providing a basis for the normal biological and physiological mechanism, both on the level of organ system and sub-cellular system, including lipid modification; lipid signaling; amino acid and protein structure, protein sorting, transport, identification; carbohydrate metabolism; glucose absorption and transporter regulation; insulin and other hormone important for glucose regulation; carbohydrate modification; nucleotide; gene and chromosome; transcription regulation; and translation regulation.

## Course Learning Outcomes

| On successful completion of this course students will (be): | | Bloom's Taxonomy |
|---|---|---|
| **CLO1:** | Demonstrate a comprehensive understanding of modification of lipid (Lipid modifications of cells molecule, Lipid Domains in EGF Receptor Signaling, PDK1, PIKK Family, Arachidonic Acid-regulation Ca2+ Channel) and signaling of the lipid (Inositol 1,4,5-trisphosphate 3-kinase and 5-phosphatase, Phospholipase A2, C, D, PKC, IP3 Receptors, PH Domains, Ceramide in Cell Regulation, Cholesterol Signaling) | Level 2. Understanding |
| **CLO2:** | Demonstrate a comprehensive understanding of structure of amino acid and protein (structure, classification, peptide bond, force that important for protein structure protein, protein synthesis, processing, and regulation), protein sorting, protein transport, identification of protein correlated with protein work during research | Level 2. Understanding |
| **CLO3:** | Demonstrate a comprehensive understanding of carbohydrate metabolism, glucose absorption and transporter regulation, insulin and another hormone important for glucose regulation, and carbohydrate modification | Level 2. Understanding |
| **CLO4:** | Demonstrate a comprehensive understanding of nucleotide, gene and chromosome, transcription regulation, and translation regulation | Level 2. Understanding |
| **CLO5:** | Able to interpret the scientific paper relating to the understanding of lipid, protein, carbohydrate and nucleotide, and communicate it through oral presentation | Level 3. Applying |
| **CLO6:** | Demonstrate self-directed learning and ethical standards for the intellectual activities | Level 3. Applying |

### Links between CLOs and PLOs

| | PLO1.1 | PLO1.2 | PLO2.1 | PLO2.2 | PLO2.3 | PLO3.1 | PLO3.2 | PLO3.3 | PLO3.4 | PLO4 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | |
| **CLO3** | √ | | | | | | | | | |
| **CLO4** | √ | | | | | | | | | |
| **CLO5** | √ | | √ | | | √ | √ | | | √ |
| **CLO6** | | | | | | | √ | | | √ |

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## Topic and Schedule

| Week | Topics | Competencies | Lecturer |
|---|---|---|---|
| 1 | Lipid modification | Able to explain: Lipid modifications of cells molecule, Lipid Domains in EGF Receptor Signaling, PDK1, PIKK Family, Arachidonic Acid-regulation $Ca^{2+}$ Channel | HS |
| 2 | Lipid signaling | Able to explain: Inositol 1,4,5-trisphosphate 3-kinase and 5-phosphatase, Phospholipase A2, C, D, PKC, IP3 Receptors, PH Domains, Ceramide in Cell Regulation, Cholesterol Signaling | HS |
| 3 | Amino Acid and protein structure | Able to explain: The chemistry of the cell, amino acid: structure, classification, peptide bond, force that important for protein structure protein, protein synthesis, processing, and regulation | SR |
| 4 | Protein sorting, transport, identification | Able to explain: Protein sorting and transport, protein function, protein identification correlated with protein work during research | SR |
| 5 | Journal reading and oral presentation 1 | Able to interpret the scientific paper relating to the understanding of the lipid and protein, then able to communicate effectively and succinctly through oral presentation | HS + SR |
| **6** | **Mid-term Exam** | | **TEAM** |
| 7 | Carbohydrate metabolism | Able to explain: carbohydrates, structure and physiologic significance, overview of metabolism, glycolysis, metabolism of glycogen, gluconeogenesis, the pentose phosphate pathway & other pathways of hexose metabolism | AU |
| 8 | Glucose absorption and transporter regulation | Able to explain: Glucose absorption and transport into the cells, glucose transporter, and their regulation | AU |
| 9 | Insulin and another hormone important for glucose regulation | Able to explain: Hormone that's important in carbohydrate metabolism, insulin, insulin receptor and signaling, glucagon and steroids hormones | AU |
| 10 | Carbohydrate modification | Able to explain: Carbohydrate modification of cells molecules and their significant role in structure and function, Glycoprotein, extracellular matrix | AU |
| 11 | Nucleotide | Able to explain: Nucleotide, Deoxyribonucleic acid and Ribonucleic acid metabolism and catabolism | TY |
| 12 | Gene and chromosome | Able to explain: Gene and chromosome structure related to gene locus and map | TY |
| 13 | Transcription regulation | Able to explain: Transcription and transcription regulation, promoter, enhancer, regulator, transcription factor | TY |
| 14 | Translation regulation | Able to explain: Messenger RNA, Transfer RNA, Ribosomal RNA, Regulation of translation, start codon, stop codon, initiation factors. | TY |
| 15 | Journal reading and oral presentation 2 | Able to interpret the scientific paper relating to the understanding of the carbohydrate and nucleotide, then able to communicate effectively and succinctly through oral presentation | AU + TY |
| 16 | **Final-Exam** | | **TEAM** |

**Lecturers:**

HS : Hidayat Sujuti, dr. PhD, Sp.M (081330535061)
SR : Saifurrohman, dr., Sp.JP., Ph.D (085234217292)
AU : Aulani'am, Prof. drh., DESS (08123317600)
TY : Tri Yudani M Raras, Dr.rer.nat., M.App.Sc (085791300192)

## Teaching and Learning Strategy

Core material will be delivered through lectures, completed with oral presentation of scientific journal reading.

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## Assessment Methods

| Type | Weighting | CLO Assessed | Description |
|---|---|---|---|
| Journal reading and oral presentation | 20% | 1/2/3/4, 5, 6 | The assessment will comprise a 1000 word executive summary (in English) of research paper or review from scientific journals; this assessment includes a 15 minutes presentation on the highlights of the journal followed by 10 minutes of discussion. Executive summary and presentation slides should be submitted via email one week after the oral presentation. |
| Written exam (mid) | 40% | 1, 2, 6 | The examination will be a 2 hour unseen paper with questions on theoretical aspects of medical biochemistry. |
| Written exam (final) | 40% | 3, 4, 6 | |

## Learning Sources

| | |
|---|---|
| **Essential reading/resources** | 1. **Harper's Illustrated Biochemistry,** 28th Edition, By Robert Murray. Publisher: McGraw-Hill Medical Publishing Division<br>2. **Devlins Textbook of Biochemistry and Clinical Correlation**, 4th Edition, John Wiley & Sons.<br>3. **Lehninger's Principles of Biochemistry**, 5th Edition, David L. Nelson and Michael M. Cox.<br>4. **Molecular Biology of the Cell,** 6th Edition, by Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts and Peter Walter. Publisher: Garland Science.<br>5. **Molecular Cell Biology**, 7th Edition, by Harvey Lodish, Arnold Beck, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon and Matthew P. Scott. Publisher: W. H. Freeman |
| **Further reading/resources** | Scientific Journals (Clinical Biochemistry, Biochemistry Journal, The International Journal of Biochemistry & Cell Biology, The New England Journal of Medicine, The Journal of Biochemistry, etc.) |

**Course Coordinator,**

**dr. Hidayat Sujuti, Ph.D., Sp.M**.