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KHALĪFAH • AMĀNAH • IQRĀ' • RAHMATAN LIL-ĀLĀMĪN
LEADING THE WORLD



AN INTERNATIONAL AWARD-WINNING INSTITUTION FOR SUSTAINABILITY

DEPARTMENT OF BASIC MEDICAL SCIENCES
KULLIYAH OF MEDICINE
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

BASIC LABORATORY STUDY GUIDE

Academic Session 2022/2023

Updated: March 2023

**MASTER OF MEDICAL SCIENCES,
MASTER OF HEALTH SCIENCES
&
PhD IN HEALTH SCIENCES**

Senate Endorsement Master of Medical Sciences:

25th March 2022 (486th Senate Meeting)

Senate Endorsement of Master & PhD of Health Sciences:

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Any absence due to sickness or any unforeseen circumstances must be notified to the course coordinators as soon as possible and must be supported by suitable documentation e.g. sick certification

General Laboratory Techniques and Instrumentation METL 7142

Directory of Course Instructors

No.	Name	Email	Department
1.	Prof. Dr. K.N.S. Sirajudeen Kuttulebbai Naina Mohamed Salam	knssiraj@iium.edu.my	Basic Medical Sciences, KOM
2.	Prof. Dr. Imad Mustafa Al-Deen Mustafa Mahmud	imad@iium.edu.my	Basic Medical Sciences, KOM
3.	Prof. Dr. Md. Abdus Salam	abdussalam@iium.edu.my	Basic Medical Sciences, KOM
4.	Prof. Dr. Azian Abd Aziz	azian@iium.edu.my	Radiology, KOM
5.	Assoc. Prof. Dr. Nor Zamzila Abdullah	zamzila@iium.edu.my	Pathology & Laboratory Medicine, KOM
6.	Assoc Prof. Dr. Hairul Aini Hamzah	hairulaini@iium.edu.my	Basic Medical Sciences, KOM
7.	Asst. Prof. Dr. Yusoff Sharizal Yusoff Azmi Merican	ysharizal@iium.edu.my	Basic Medical Sciences, KOM
8.	Asst. Prof. Dr. Zunariah Buyong	drzuna@iium.edu.my	Basic Medical Sciences, KOM
9.	Asst. Prof. Dr. Noraihan Mat Harun	noraihan@iium.edu.my	Basic Medical Sciences, KOM
10.	Asst. Prof. Dr. Nour El Huda Abd Rahim	elhuda@iium.edu.my	Basic Medical Sciences, KOM

Section 1: Course Synopsis

This course is designed to enhance the students' knowledge in theory and principles of laboratory techniques, instrumentations, and their applications. It is a compulsory course for all students who registered Master in Medical Sciences (Mixed Mode). Satisfactory completion of the course is based on the required assessment.

This course imparts the elements of *Iqra'* and *Khalifah* within the lectures, seminars and demonstrations to integrate contemporary knowledge in medical sciences with attributes to independent lifelong learning. These elements are crucial in preparing the students to become holistic graduates who adhere to good governance with respect to different cultures, race and religion.

Section 2: Learning Outcome

At the end of the course, the students should be able to:

1. Distinguish the principles of laboratory safety handling and applications of the laboratory instruments used in medical research laboratories.
2. Appraise and apply the knowledge acquired in research works.

Section 3: Teaching Format and Guidelines

1. Lecture
2. Practical
3. Demonstration
4. Seminar
5. Presentation
6. Self directed learning

Section 4: Course Assessment

Presentation	30%
Participation/Attendance	70%

Section 5: Course Content

No.	Topic	Mode of Delivery
1.	Laboratory safety (Chemical Hazards)	Seminar
2.	Laboratory safety (Radiological Hazards)	Seminar
3.	Laboratory safety (Microbiological Hazards)	Seminar
4.	Sterilization & disinfection	Lecture/Demo/Practical
5.	Preparation of buffer & reagent	Lecture/Demo/Practical
6.	Incubators & balances	Lecture/Demo/Practical
7.	Refrigeration & Freezers	Lecture/Demo/Practical
8.	Spectrophotometry & Turbidometry	Lecture/Demo/Practical
9.	Waterbaths & Sonicators	Lecture/Demo/Practical
10.	Water purification	Lecture/Demo/Practical
11.	Centrifuge and ultracentrifuge	Lecture/Demo/Practical
12.	Chromatographic Systems	Seminar
13.	Cryopreservation & Flowcytometry	Lecture/Demo/Practical
14.	Microscopy	Lecture/Demo/Practical
15.	Fluorescence Microscopy	Lecture/Demo/Practical
16.	Scanning Electron microscopy	Lecture/Demo/Practical
17.	Transmission Electron microscopy	Lecture/Demo/Practical
18.	ELISA/Radioimmunoassay	Lecture/Demo/Practical

Section 6: Learning Resources

Required Textbook

1. Burtis, C. A. & Bruns, D.E. (2015). Tietz fundamentals of clinical chemistry and molecular diagnostic (7th Edition.). W.B. Saunders.
2. Rifai, N., & Gay-Lussac, J. L. (2018). Tietz textbook of clinical chemistry and molecular diagnostics (6th Edition.). Elsevier Saunders.
3. Furr AK (2000); CRC handbook on laboratory safety, 5th. Ed

Recommended Textbook

1. McPherson, R. A. (2016). Henry's clinical diagnosis and management by laboratory methods (23rd. ed). Elsevier Saunders.
2. Aboul-Enein, H. Y. (2003). Separation techniques in clinical chemistry. Marcel Dekker

Tissue Culture METL 7211

Directory of Course Instructors

No.	Name	Email	Department
1.	Prof. Dr. Imad Mustafa Al-Deen Mustafa Mahmud	imad@iium.edu.my	Basic Medical Sciences, KOM
2.	Assoc Prof. Dr. Hairul Aini Hamzah	hairulaini@iium.edu.my	Basic Medical Sciences, KOM
3.	Asst. Prof. Dr. Hazulin Mohd Radzuan	hazulin@iium.edu.my	Basic Medical Sciences, KOM

Section 1: Course Synopsis

This course consists of the principles, uses and applications of cell cultures in diagnosis of diseases and medical research. The topic include on how to set up and equip a cell culture laboratory, sterilization of fluids and equipment, preparation of culture media, and culture technique, the maintenance of cell lines, specific cell types and their requirements, quality control of cell lines and the prevention, detection ,and cure of contamination and good laboratory practice in the cell culture laboratory

This course imparts the elements of *Iqra'* and *Khalifah* within the lectures, seminars and demonstrations to integrate contemporary knowledge in medical sciences with attributes to independent lifelong learning. These elements are crucial in preparing the students to become holistic graduates who adhere to good governance with respect to different cultures, race and religion.

Section 2: Learning Outcome

At the end of the course, the students should be able to:

1. Classify and distinguish the various types of tissue cultures.
2. Evaluate the applications of tissue cultures in medical research and diagnosis of diseases.
3. Display the skills in laboratory techniques related to tissue cultures

Section 3: Teaching Format and Guidelines

1. Lecture
2. Practical
3. Seminar

Section 4: Course Assessment

Practical Reports	40%
Final examination	50%
Participation	10%

Section 5: Course Content

No.	Topic	Mode of Delivery
1.	Introduction to tissue culture	Lecture
2.	Safety in tissue culture laboratory	Lecture
3.	Biology of cultured cells	Lecture
4.	Cytotoxicity and cell viability assays	Lecture
5.	Practical 1	Practical
6.	Practical 2	Practical
7.	Seminar: Tissue culture in Medical Sciences	Seminar

Section 6: Learning Resources

Required Textbook

1. Freshney, R. I (2016) Culture of animal cells: A manual of basic techniques and specialized applications (7th ed). Willey Blackwell.
2. Al-Rubeai M (2015). Animal cell culture. Springer
3. Davis, J.M. (2011). Animal cell culture: Essential methods. Wiley-Blackwell

General Molecular and Proteomic Techniques

METL 7232

Directory of Course Instructors

No.	Name	Email	Department
1.	Prof. Dr. K.N.S. Sirajudeen Kuttulebbai Naina Mohamed Salam	knssiraj@iiium.edu.my	Basic Medical Sciences, KOM
2.	Prof. Dr. Imad Mustafa Al-Deen Mustafa Mahmud	imad@iiium.edu.my	Basic Medical Sciences, KOM
3.	Assoc. Prof. Dr. Nor Zamzila Abdullah	zamzila@iiium.edu.my	Pathology & Laboratory Medicine, KOM
4.	Assoc Prof. Dr. Hairul Aini Hamzah	hairulaini@iiium.edu.my	Basic Medical Sciences, KOM
5.	Assoc Prof Dr Norlelawati A Talib	noleata@iiium.edu.my	Pathology and Laboratory Medicine, KOM
6.	Asst. Prof. Dr. Nour El Huda Abd Rahim	elhuda@iiium.edu.my	Basic Medical Sciences, KOM
7.	Asst. Prof. Dr. Mohd fadly Mohd Nor	mohdfadly@iiium.edu.my	Basic Medical Sciences, KOM

Section 1: Course Synopsis

This course covers the fundamental aspects of molecular biology and proteomics laboratory techniques. Students will be exposed to the theory and principles of molecular and proteomic techniques which include RNA, DNA and protein purification from tissue specimens, cDNA/DNA amplification by conventional and real-time polymerase chain reaction (PCR), polyacrylamide gel electrophoresis (PAGE), protein blotting and hardware and software of molecular and proteomics analysis. The techniques can be mastered through hands-on practicals. The course also encourages students to keep abreast of the current molecular and proteomics technologies through seminars.

This course imparts the elements of *Iqra'* and *Khalifah* within the lectures, seminars and demonstrations to integrate contemporary knowledge in medical sciences with attributes to independent lifelong learning. These elements are crucial in preparing the students to become holistic graduates who adhere to good governance with respect to different cultures, race and religion.

Section 2: Learning Outcome

At the end of the course, the students should be able to:

1. Point out the principles and applications of the techniques used in molecular and proteomic laboratories.
2. Demonstrates skills in molecular and proteomic laboratory techniques and relates the skills and knowledge acquired in research works.
3. Point out and appraise the current and new molecular and proteomics techniques in different medical research fields.

Section 3: Teaching Format and Guidelines

4. Lecture
5. Practical
6. Journal Critique

Section 4: Course Assessment

Practical reports	40%
Presentation	50%
Participation	10%

Section 5: Course Content

No.	Topic	Mode of Delivery
1.	Introduction to basic techniques in molecular & proteomic laboratory	Lecture
2.	Basic PCR	Lecture
3.	Basic Structure of proteins	Lecture
4.	Protein purification	Lecture
5.	Purification of total RNA from tissue specimen	Practical
6.	Purification of DNA from whole blood	Practical
7.	Primer dilution, PCR & Gel electrophoresis	Practical
8.	Real-time PCR	Lecture
9.	PAGE Electrophoresis	Lecture
10.	Western blotting and Video Demonstration	Lecture
11.	DNA Sequencing & Bioinformatics	Lecture
12.	Preparation for Journal Critique	Discussion
13.	SEMINAR: Journal Critique on Molecular and Proteomics Medicine	Seminar

Section 6: Learning Resources

Required Textbook

1. Carson, s., Miller, HB Srougi, MC & Witherow, DS (2019). Molecular biology techniques: a classroom laboratory manual. Academic Press
2. Filion, M. (2012). Quantitative Relat-time PCR in Applied Microbiology. Caister Academic Press.
3. Lovric, J (2014). Introducing proteomics: From concepts to sample separation, mass spectrometry and data analysis. Wiley-Blackwell
4. Sambrook, J & Russell, DW (2001). Molecular Cloning: A laboratory manual, (3rd Etn). Cold Spring Harbor Laboratory Press

Recommend

1. McPherson, RA (216). Henry's clinical diagnosis and management by laboratory methods (23rd edtn). Elsevier Saunders.
2. Aboul-Enein, HY (203). Separation techniques in clinical chemistry. Marcel Dekker