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**UQUMED**

**Special Topics-I Module**

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**Life Cycle and Molecular Cell Biology of  
Malaria Parasite**

2017 / 2018

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## **Table of Contents**

<b>Table of Contents</b> .....	<b>2</b>
<b>Important contact:</b> .....	<b>3</b>
<b>General information:</b> .....	<b>4</b>
<b>Description and Aims of the course</b> .....	<b>4</b>
<b>Schedule of required student activities</b> .....	<b>5</b>
<b>Course materials/ resources</b> .....	<b>5</b>
<b>Course learning objectives</b> .....	<b>5</b>
<b>Grading/Assessment and evaluation of student performance</b> .....	<b>5</b>
<b>Specific Learning Outcome of the course</b> .....	<b>6</b>
<b>Weekly Schedules:</b> .....	<b>7</b>
<b>Student evaluation of course</b> .....	<b>7</b>

## Important contact

No.	Important Contacts	Names	Emails
1.	<b>Year 3 Lead</b>	Dr. Abeer Barhameen	<a href="mailto:barhameen@yahoo.com">barhameen@yahoo.com</a>
2.	<b>Year 3 Admin Lead</b>	Mrs. Ohoud Wazqar	<a href="mailto:Ohoud.wazqer@hotmail.com">Ohoud.wazqer@hotmail.com</a>
3.	<b>Special Topics Module Lead</b>	Dr. Saed Altharhi Dr. Heba Adly	<a href="mailto:sasharhi@uqu.edu.sa">sasharhi@uqu.edu.sa</a> <a href="mailto:hebamadly@hotmail.com">hebamadly@hotmail.com</a>
4.	<b>Course Coordinator</b>	Dr. Abdul Hafiz	<a href="mailto:knn215@gmail.com">knn215@gmail.com</a>

Module name	Special Topic I	Credit Units	2 CU
Course Number	10002909-2	Week length:	2 weeks
Module Code	3S1	Year of Program:	Year 3

## General information

<b>Course Title:</b>	<b>Malaria Parasite: Life Cycle and Molecular-cell biology</b>		
<b>Course Director</b>	<b>Dr. Saeed Al Harthi</b>		
<b>Academic Department</b>	<b>Medical Parasitology</b>		
<b>Contact information</b>	<b>Email: sasharhi@uqu.edu.sa</b>	<b>Mobile: 0500779000</b>	
<b>Maximum number of students</b>	<b>10 male and 10 female</b>		
<b>Participating instructors</b>	<b>Four</b>		
<b>Faculty:</b>	<b>Dr. Rowaida Bakri, Dr. Abdul Hafiz, Dr. Mohammed El Bali, Dr. Raafat Makhlof</b>		
<b>Fellows:</b>	<b>-</b>		
<b>Others:</b>	<b>-</b>		
<b>Relevant clinic information</b>	<b>Location</b>	<b>Not applicable</b>	<b>Phone -</b>
<b>Relevant Research information</b>	<b>Location :</b>	<b>College of Medicine, UQU</b>	<b>Phone: 0501907855</b>
<b>Perquisites “if any”</b>	<b>Open for all 3<sup>rd</sup> year students in 2017-18</b>		

## Description and Aims of the course

Malaria causes about 200 million annual clinical cases worldwide. Malaria control programme in Saudi Arabia is in the elimination phase with focal malaria transmissions and severe malaria cases reported in the southern region. There is however a continuous inflow of malaria from emigrants and pilgrims in Saudi Arabia from malaria endemic countries.

This course is designed to provide students with hands on practical training on some of the basic molecular biology and cell biology techniques in malaria. The students will work in the Bio-safety level 2 laboratory settings. Students will be introduced to safety principals and practices in a BSL2 laboratory. The course also involves practical hands-on training on *in vitro* culture of blood stage *Plasmodium falciparum*, cryopreservation & thawing of *P. falciparum* cultures as well as synchronization of *P. falciparum* cultures. The students will learn to count parasitemia and plot growth curves of *P. falciparum* cultures. In addition, the students will learn how to prepare genomic DNA of *P. falciparum* and perform polymerase chain reaction (PCR).

This course is aimed to develop professionalism and research abilities among the students. In addition, this course will introduce students with the techniques and procedures that are used in the contemporary malaria molecular and cell biology research.

## Schedule of required student activities

The course will be delivered in the medical parasitology department, College of Medicine, Umm Al Qura University. The course consists of interactive lectures, practical demonstrations, case based learning, task based learning and practical hands on training. Assessment will be done during the course. The assessment will examine what the participants have learned during the course. The course does not involve any homework.

## Course materials/ resources

1. **Methods in Malaria Research (6<sup>th</sup> Edition):**  
[https://www.beiresources.org/portals/2/MR4/Methods\\_In\\_Malaria\\_Research-6th\\_edition.pdf](https://www.beiresources.org/portals/2/MR4/Methods_In_Malaria_Research-6th_edition.pdf)
2. **Plasmodium Genome Database**  
[www.plasmodb.org](http://www.plasmodb.org)
3. Animated videos of malaria life cycle  
<http://www.hhmi.org/biointeractive/malaria-human-host>  
<http://www.hhmi.org/biointeractive/malaria-mosquito-host>

## Course learning objectives

This course is designed to train students on SaudiMED competencies such as research, ethics and professionalism. The course has following specific objectives

- To enable students to interpret results of microscopic malaria diagnosis.
- To provide hands on training on *in vitro* malaria parasite culture, synchronization of malaria cultures, cryopreservation and revival of cryopreserved malaria cultures.
- To enable students to analyze parasitemia levels from *P. falciparum* cultures and plot growth curves.
- To provide hands on training on malaria molecular and cell biology techniques namely malaria parasite genomic DNA preparation, polymerase chain reaction (PCR), separation and visualization of amplified DNA through gel electrophoresis and staining.

## Grading/Assessment and evaluation of student performance

The participants will be evaluated on multiple criteria. One of the criteria is attendance, which will have 20% weight in the overall marking. Participants will be required to complete 'online learning module' during the contact hours. The 'online learning module' is comprised of watching the two videos listed at the point number 3 of 'Course material/resources'. Quiz on the online learning module will carry 20% of the total marks. Satisfactory completion of the task assigned in the task based learning will carry 30% of the total marks. The task can be submitted anytime during the working days of the 2 week course (Sunday to Thursday). On the final day of the course, there will also be a multiple choice question (MCQ) test comprising 30% of the total marks. The questions in the test will examine what participants have learned from the practical training objectives.

## Specific Learning Outcome of the course

Week	Topics	Teaching Staff (M&F)	Teaching Methods	Learning Objectives (LOCs) By the end of this session, the students should be able to:
W1	Safety principals and practices for the Bio-safety level 2 (BSL2) laboratory	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture	<ul style="list-style-type: none"> <li>Practice laboratory safety for the BSL2 laboratory</li> </ul>
	Preparation of media and reagents	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, Practical Demonstration, Hands on training	<ul style="list-style-type: none"> <li>Prepare culture media and reagents according to the compositions</li> <li>Understand the importance of media contents</li> </ul>
	Introduction to the Plasmodium life cycle and stages	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, Practical demonstration, hands on training	<ul style="list-style-type: none"> <li>Distinguish different stages of the life cycle of malaria parasite</li> <li>Identify different blood stages of <i>P. falciparum</i></li> </ul>
	Principals and practice of <i>P. falciparum</i> in vitro culture	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, Practical demonstration, hands on training	<ul style="list-style-type: none"> <li>Thaw cryopreserved <i>Plasmodium falciparum</i></li> <li>In vitro culture blood stage <i>P. falciparum</i></li> <li>Cryopreserve <i>P. falciparum</i> cultures</li> </ul>
	<i>Plasmodium falciparum</i> in vitro culture manipulations	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, hands on training, case based learning	<ul style="list-style-type: none"> <li>Synchronize blood stage <i>P. falciparum</i> cultures</li> <li>Counting parasitemia from in vitro cultures</li> <li>Plotting growth curves</li> </ul>
W2	Introduction to Plasmodium genome and Plasmodium genomic database PlasmoDB	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, Computer based learning	<ul style="list-style-type: none"> <li>Recognize the salient features of genetic material of malaria parasite</li> <li>Navigate PlasmoDB database</li> <li>Retrieve specific gene and protein sequences from the database</li> <li>Perform genomic sequence BLAST</li> <li>Interpret BLAST results</li> </ul>
	Genomic DNA preparation	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, Practical demonstration, hands on training	<ul style="list-style-type: none"> <li>Prepare genomic DNA from <i>P. falciparum</i> cultures</li> </ul>
	Principals of primer designing for polymerase chain reaction (PCR)	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, Practical demonstration, hands on training	<ul style="list-style-type: none"> <li>Analyze genomic sequence and design primers for specific regions of genes to be used in polymerase chain reaction (PCR)</li> </ul>
	Polymerase chain reaction (PCR)	Dr. R. Bakri, Dr. A. Hafiz, Dr. M El Bali, Dr. R. Makhlof	Interactive Lecture, hands on training	<ul style="list-style-type: none"> <li>Interpret results of diagnostic PCR</li> <li>Perform PCR</li> <li>Analyze the PCR product for the correct size</li> </ul>

## Weekly Schedules

### Week 1: Life cycle and cell biology

	Sunday	Monday	Tuesday	Wednesday	Thursday
8.00	-	-	-	-	-
9.00	L	IL	IL	IL	IL
10.00	IL	Lab	Lab	Lab	Lab
11.00	Lab	Lab	Lab	Lab	Lab
13.00	Lab	IL	IL	IL	IL
14.00	Lab	Lab	Lab	Lab	Lab
15.00	Lab	Lab	Lab	Lab	Lab
16.00	-	-	-	-	-

L: Lecture    LG: Large Group    IL: Interactive Lecture    Lab: Laboratory    TBL: Task Based Learning  
 CBL: Case Based Learning    FC: Flipped Class    Dis Rm: Dissection Room

### Week 2: Genomics and molecular biology

	Sunday	Monday	Tuesday	Wednesday	Thursday
8.00	-	-	-	-	-
9.00	IL	IL	-	-	-
10.00	Lab (Computer)	TBL	-	-	-
11.00	Lab (Computer)	TBL	-	-	-
13.00	IL	IL	-	-	-
14.00	Lab	Lab	-	-	-
15.00	CBL	Lab	-	-	-
16.00	-	Lab	-	-	-

## Student evaluation of course

Online evaluations of the course and faculty are required of medical students and conducted through the Quality Assurance Department. Any questions about this evaluation process may be directed to QA Department.

## Weekly Schedules/female side

### **Week 1: (Theme Title: Life cycle and cell biology)**

hr	time	Sunday	Monday	Tuesday	Wednesday	Thursday
1	8-9am	L1	L3	Lab1	Field visit +	Lab2
2	9-10am					
3	10-11am	L2	IL4	IL5	Assignment	CBL
4	11-12am					

### **Week 2: (Theme title: Genomics and molecular biology)**

hr	time	Sunday	Monday	Tuesday	Wednesday	Thursday
1	8-9am	IL6	Lab3	TBL	Lab4	Asg feedback
2	9-10am					
3	10-11am	IL7		IL8		Pract exam
4	11-12am					

## Weekly Schedules/male side

### **Week 1: (Theme Title: Life cycle and cell biology)**

hr	time	Sunday	Monday	Tuesday	Wednesday	Thursday
1	8-9am	L1	L3	CBL	IL5	Field visit +
2	9-10am					
3	10-11am	L2	IL4	Lab1	Lab2	Assignment
4	11-12am					

### **Week 2: (Theme title: Genomics and molecular biology)**

hr	time	Sunday	Monday	Tuesday	Wednesday	Thursday
1	8-9am	Lab3	IL6	Lab4	TBL	Pract exam
2	9-10am					
3	10-11am		IL7		IL8	Asg feedback
4	11-12am					

L: Lecture    LG: Large Group    IL: Interactive Lecture    Lab: Laboratory    TBL: Task Based Learning  
 CBL: Case Based Learning    FC: Flipped Class    Dis Rm: Dissection Room

Attendance	20%
Quiz 1	10%
Quiz 2	10%
E-learning exam	10%
TBL assessment	10%
Assignment (Field visit Report)	20%
Practical exam	20%