

In the Name of God

Course Guide: Medical Physiology – Blood Physiology

Course Code: 117

Course Instructor: Dr. Elham Karimi-Saleh

Contact Number / Student Access: +98 41 33364664

Prerequisite or Corequisite: None

Semester: Both semesters

Credits: 0.4 (0.3 Theory – 0.1 Practical)

Level: Basic Medical Sciences – First Semester

Number of Sessions: 3 theoretical sessions – 2 practical sessions

Course Duration: Five weeks, following completion of *Cell 2* sessions

Weekly Schedule: Saturday 12:00–14:00

Venue: Faculty of Medicine

Practical Classes: Physiology Laboratory

Online Class Link: All sessions are held in person.

General Objective of the Course

In this course, students are expected to learn the physiological concepts, principles, and mechanisms related to the functions of blood in the following areas and to identify them in both normal and altered physiological conditions:

1. Blood and its components; plasma constituents; and differences between plasma and serum.
2. Physiology of red blood cells: synthesis and destruction, hemoglobin structure and synthesis, iron metabolism, anemia, polycythemia, and their effects on the cardiovascular system.
3. Physiology of white blood cells: types, characteristics, sites of synthesis and maturation, and the roles of neutrophils and tissue macrophages in the immune system.
4. Physiology of platelets, coagulation factors, and the mechanisms of blood coagulation; stages of hemostasis and the role of platelets.

Theoretical Unit

After completing this course, students should be able to:

1. Identify the components of blood and plasma.
2. Explain the production and maturation of red blood cells.

3. Describe hemoglobin synthesis.
4. Explain the roles of erythropoietin, vitamin B₁₂, and folic acid in RBC formation and maturation.
5. Describe iron metabolism.
6. Identify various types of anemia and their effects on the cardiovascular system.
7. Recognize different types of polycythemia and describe their effects.
8. Name the different types of white blood cells.
9. Understand the production, characteristics, and lifespan of WBCs.
10. Identify the reticuloendothelial system.
11. Explain the defensive properties of neutrophils and macrophages.
12. Describe the process of inflammation and the role of WBCs in it.
13. Explain the functions of basophils, eosinophils, and macrophages.
14. Understand the production, features, and lifespan of platelets and their role in coagulation.
15. Describe the stages of hemostasis (vascular spasm, platelet plug formation, and blood coagulation).
16. Explain the mechanisms of coagulation (intrinsic and extrinsic pathways).
17. Recognize common coagulation disorders.

Practical Unit – Blood Physiology Experiments

After completing the practical sessions, students should be able to:

Part I

1. Explain the principles of the bleeding time test and platelet function.
2. Understand the basis of coagulation time tests and the function of coagulation factors.
3. Perform bleeding and coagulation time tests collaboratively and interpret the results.
4. Explain the principles of hemolysis experiments and identify the required equipment.
5. Perform the osmotic fragility test of RBC membranes and interpret the results.

Part II

6. Explain the principles of tests for hemoglobin concentration, hematocrit percentage, and erythrocyte sedimentation rate (ESR).
7. Perform these tests collaboratively with group members.
8. Interpret the experimental results.

Teaching Methods

1. Lectures will be delivered in person according to the schedule announced at the beginning of the course.
2. Teaching aids such as PowerPoint presentations, whiteboard, and educational videos will be used during classes.
3. Question-and-answer sessions and participatory discussions will be included to enhance motivation and conceptual understanding.

4. Practical sessions will be conducted in the physiology laboratory using available equipment. Students will actively participate in conducting and interpreting the experiments.

Assessment and Grading

1. Theoretical exam: 18 points (MCQs); Practical exam: 2 points.
2. Additional points (beyond the total of 20) may be granted for regular attendance, active class participation, and completion of optional assignments.

Minimum passing grade: 10 out of 20.

Absence Policy:

According to the total number of instructional hours allocated to this course (as per the approved academic regulations), the student is not permitted to be absent from any session. Absence is allowed only in justified cases, and only up to a maximum of four seventeenths of the total course hours.

References

Theoretical Course:

- *Guyton and Hall Textbook of Medical Physiology* (latest edition)
- *Ganong's Review of Medical Physiology* (latest edition)

Practical Course:

- *Practical Physiology* (authored by the Department of Physiology faculty, available in the department laboratory)

Contact Information

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