In the Name of God

Course Guide: Medical Physiology – Gastrointestinal Physiology

Course Code: 116

Course Instructor: Dr. Elham Karimi-Saleh
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Prerequisite or Corequisite: Cellular Physiology
Semester: Both semesters

Credits: 0.7 (0.6 Theory – 0.1 Practical)
Level: Basic Medical Sciences – Semester 3
Number of Sessions: 5 theoretical sessions, 1 practical session
Course Duration: 6 weeks
Weekly Schedule: Tuesdays – 14:00–16:00

Venue: Faculty of Medicine

Practical Classes: Physiology Laboratory
Online Class Link: All sessions are held in person.

Overall Objective of the Course

In this course, students are expected to learn the concepts, principles, and physiological mechanisms related to the function of the gastrointestinal system in the following areas, and to be able to recognize them in both normal and altered physiological conditions:

1. Structure and function of the gastrointestinal system
2. Gastrointestinal motility
3. Gastrointestinal secretions and their functions
4. Processes of digestion and absorption in different parts of the gastrointestinal tract
5. Functions of bile, saliva, pancreas, and liver
6. Neural and hormonal regulation of the gastrointestinal system
7. The process and stages of swallowing
8. Mixing and propulsive movements of the gastrointestinal tract and their roles
9. Gastric movements and their role in digestion
10. Migrating myoelectric complex and hunger contractions
11. Mechanisms regulating gastric emptying
12. Types of small intestinal movements, their functions, and control mechanisms
13. Movements of various parts of the large intestine, their characteristics, and regulatory mechanisms
14. Defecation reflex

15. Salivary glands, composition of saliva, and regulation of salivary secretion
16. Types of gastric cells and their specific secretions
17. Mechanism of gastric acid production
18. Mechanisms and phases of gastric secretion regulation
19. Pancreatic secretions, their functions, and regulation
20. Bile and its role in fat digestion and absorption
21. Enterohepatic circulation of bile
22. Secretions of the small and large intestines and their regulation
23. Mechanisms of carbohydrate digestion and absorption
24. Digestion and absorption of proteins
25. Digestion and absorption of fats in the gastrointestinal tract

Specific Objectives

Theoretical Section

It is expected that students, upon completion of this course, will be able to:

1. Explain the general principles of regulation in the gastrointestinal system.
2. Describe the hormonal regulation of the gastrointestinal system.
3. Explain the role of the autonomic nervous system in the regulation of the gastrointestinal system and describe the enteric nervous system and its components.
4. Describe the intrinsic control of gastrointestinal smooth muscles, and explain slow waves and their role in regulating gastrointestinal functions.
5. Explain the mechanism, importance, and control of mastication (chewing) in the mouth.
6. Describe the different stages of swallowing and explain their control mechanisms.
7. Explain the roles of the upper and lower esophageal sphincters and define the concepts of reflux and achalasia.
8. Describe gastric motility and identify the factors that affect the rate of gastric emptying.
9. Explain the types of small intestinal movements and the role of each in facilitating digestion and absorption of nutrients in the small intestine.
10. Describe the movements of the large intestine and their physiological functions.
11. Explain the defecation reflex and the neural centers involved in its regulation.
12. Describe the composition, importance, and regulation of salivary gland secretions.
13. Identify the gastric secretory cells and describe the types of gastric secretions produced by each.
14. Explain the different phases of gastric acid secretion stimulation.
15. Describe the effects of parietal cell stimulation on the ionic composition of gastric acid.
16. Identify the types of exocrine pancreatic secretions and explain the functions of each.
17. Describe the components and physiological significance of bile, and explain the enterohepatic circulation.
18. Explain the secretions of the small intestinal wall and their roles in digestion.
19. Describe the metabolic functions of the liver.
20. Explain the mechanisms of carbohydrate absorption in the small intestine.

21. Describe the mechanisms of protein absorption in the small intestine.
22. Explain the mechanisms of fat absorption in the small intestine.
23. Explain the mechanisms of water absorption in the gastrointestinal tract.
24. Describe the role of the large intestine in the absorption of water and electrolytes.

Practical Unit – Gastrointestinal Physiology Experiments

It is expected that students, upon completion of this section, will be able to:

- Define basal metabolism and describe the methods used for its measurement.

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)
  For further reading:
- *Berne & Levy 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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