Doctoral Program in Gastroenterology
Compulsory courses

Program Director: *Prof. Dr. László Czakó, full professor*

Endocrinology of the Gastrointestinal System (Lead instructor. Dr. János Gardi, Department of Internal Medicine I; 28 hours/6 credits, semester 2 or 4)

Molecular Physiology and Pathophysiology of the Gastrointestinal System (Lead instructor: Dr. Habil. Viktória Venglovecz, Institute of Pharmacology and Pharmacotherapy; 28 hours/6 credits, semester 2 or 4)

Modern Diagnostic and Therapeutic Endoscopy (Lead instructor: Prof. Dr. László Czakó, Department of Internal Medicine I; 28 hours/6 credits, semester 2 or 4)

Course description

Informing students on course requirements
From September 2025

Program: **PhD full-time training, compulsory course**
Course: **Endocrinology of the gastrointestinal system**
Course code**: EODI-GASTR-01**
Academic year/Semester: **Spring semester**
Educator and contact details (e-mail): **Dr. Janos Gardi PhD** Department of Internal Medicine; gardi.janos@med.u-szeged.hu
Type of course: lecture/seminar/practice/laboratory
Weekly hours of the course: **2**
Credit vale of the course: **6**
Type of examination**: five scale report**, practice exam, other:……..
Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): **none**

Purpose of course:

Introduction to hormones and neuropeptides regulating the gastrointestinal system (structure, mechanism of action, receptors).

Review of immunoassay methods for hormone determination.

Overview of clinical aspects of gastrointestinal peptides.

Outcome requirements of the course (specific academic results to be established by the course):

Understanding the hormones and neuropeptides involved in the regulation of gastrointestinal function, and basic knowledge of the role and clinical relevance of these peptides.

Topics:

- Basic physiological knowledge in gastroenterology, particularly to the neurohumoral regulation of gastrointestinal functions
- Basic knowledge of gastrointestinal neuroendocrinology
- Classification and mechanism of action of gastrointestinal hormones and neuropeptides
- Determination and detection of gastrointestinal hormones and neuropeptides by immunoassay procedures and immunohistochemical methods
- Synthesis of gastrointestinal peptide hormones and peptide hormone antagonists
- Clinical aspects of gastrointestinal hormones and neuropeptides
- Diagnostic and therapeutic use of gastrointestinal hormones and neuropeptides

Supporting methods to achieve learning outcomes:

Literature (candidate, Ph.D. and MTA doctoral dissertations accepted in the program so far and publications that can be downloaded by PubMed search)

There is also the opportunity to get practical experience in some immunoassay methods.

Evaluation of the acquisition of expected learning outcomes:

Attendance at lectures is mandatory. 2 absences are allowed. In case of more than two absences a certification about the absences should be presented.There is no possibility to replace the lectures. The prerequisite for completing the course is to create a short powerpoint presentation related to a specific topic of the course. The course ends with an oral exam.

Mandatory reading list:

Hyeryeong Cho, Jaechul Lim: The emerging role of gut hormones. *Mol Cells*. 47:100126 (2024) doi: 10.1016/j.mocell.2024.100126 Jens F. Rehfeld: The Endocrine Gut. In: A. Belfiore, D. LeRoith, eds,Principles of Endocrinology and Hormone Action. Springer, 2018. pp 517-531. ISBN 978-3-319-44675-2 (eBook)
Recommended reading list: László F., Janáky T.: Radioimmunoassay. Medicina, 1986. ISBN 963-241-452-7 - candidate, Ph.D. and MTA doctoral theses accepted in the program so far - scientific publications that can be downloaded by PubMed search - notes and lecture materials on the institute's website

Course description

Informing students on course requirements

From September 2025

Program: **Full-time training, compulsory course**
Course**: Molecular Physiology and Pathophysiology of the Gastrointestinal System**
Course code: **EODI-GASTR-02**
Academic year/Semester: **Spring semester**
Educator and contact details (e-mail): Dr. Viktória Venglovecz, Institute of Pharmacology and Pharmacotherapy venglovecz.viktoria@med.u-szeged.hu
Type of course: lecture/seminar/practice/laboratory
Weekly hours of the course: **2**
Credit vale of the course: **6**
Type of examination: final exam at the end of semester, practice exam, other: **written test** (multiple-choice)

Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): basic knowledge of cell physiology and molecular biology

Purpose of course:

The aim of the course is to provide students with a comprehensive understanding of the cellular and molecular mechanisms governing the function of major organs of the gastrointestinal system — particularly the pancreas and the esophagus — as well as the pathological processes that affect them. Special emphasis is placed on epithelial ion transport processes, intercellular communication, and the molecular basis of inflammatory responses. Furthermore, the course introduces modern basic research techniques (e.g., patch-clamp electrophysiology, live-cell imaging, and molecular biology methods) that are essential for studying the physiological and pathophysiological functions of the gastrointestinal tract.

Outcome requirements of the course (specific academic results to be established by the course):

Students will:

- Understand the molecular and cellular functions of the gastrointestinal system, including key ion transport mechanisms and their regulation.
- Be able to interpret the cellular mechanisms underlying inflammatory and degenerative processes.
- Acquire a theoretical understanding of modern laboratory techniques commonly used in gastrointestinal research.
- Be capable of formulating scientific problems independently and applying hypothesis-driven reasoning in gastrointestinal physiology and pathophysiology.

Topics:

- Structure and functional organization of the gastrointestinal system
- Ion transport mechanisms in pancreatic and gastric epithelial cells
- Molecular basis of inflammation in the gastrointestinal tract
- Oxidative stress, cell death, and regeneration in the pancreas
- Adaptive responses and pathological alterations in esophageal epithelial cells
- Modern experimental approaches in gastrointestinal research:

- Patch-clamp technique
- Live-cell fluorescence imaging
- Gene expression and protein analysis methods
- Application of organoid and cell culture models

Evaluation of the acquisition of expected learning outcomes:

Requirements: Attendance at a minimum of 60% of the classes (8 out of 13 sessions).

Examination requirements: Written test (multiple-choice). **Grading:** pass/fail
Mandatory reading list: Venglovecz V. et al.: Selected publications on pancreatic and epithelial ion transport (provided during the course) Barrett, K.E. et al. (2024): *Gastrointestinal Physiology*, 3rd ed., Elsevier Johnson, L.R. (ed.): *Physiology of the Gastrointestinal Tract*, 6th ed., Academic Press
Recommended reading list: Selected review articles from *Gastroenterology*, *American Journal of Physiology – Gastrointestinal and Liver Physiology*, and *Frontiers in Physiology* (to be specified during the course) Verkman, A.S. (2019): *Ion Channels and Transporters of Epithelial Cells* Guyton & Hall: *Textbook of Medical Physiology* (relevant chapters)

Indicating course requirements on CooSpace scene (summary)

Description (public): The course provides an overview of the cellular and molecular physiology and pathology of the gastrointestinal system, with a focus on the pancreas and the esophagus. It emphasizes epithelial ion transport, inflammatory mechanisms, and introduces modern experimental methods for studying physiological and pathological processes.
Requirements: Students will understand the molecular and cellular mechanisms of the gastrointestinal system and gain theoretical knowledge of key experimental methods. Completion requires at least 60% attendance and a written multiple-choice test. Grading: Pass / Fail.
Topics: Structure and function of the gastrointestinal system; ion transport; inflammation; oxidative stress; cell death and regeneration; modern research methodologies (patch-clamp, live-cell imaging, gene and protein analysis, organoid models). Supporting methods: seminars and lab demonstrations. Mandatory and recommended literature as above.

Course description

Informing students on course requirements
From September 2025

Program: **PhD full-time training, compulsory course**
Course: **Modern diagnostic and therapeutic endoscopy**
Course code: **EODI-GASTR-03**
Academic year/Semester: **Spring semester**
Educator and contact details (e-mail): **László Czakó, MD, Phd, DSc, MSc,** Department of Internal Medicine **czako.laszlo@med.u-szeged.hu**
Type of course: lecture/seminar/practice/laboratory
Weekly hours of the course: **2**
Credit vale of the course: **6**
Type of examination: five-scale report
Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): none
Purpose of course: The aim of the course is to provide students with fundamental knowledge of diagnostic and therapeutic endoscopic procedures, including their principles, indications, contraindications, and the related patient care processes.
Outcome requirements of the course (specific academic results to be established by the course): Upon successful completion of the course, the student will be able to: • Describe the main types of endoscopic procedures (e.g. gastroscopy, colonoscopy, bronchoscopy, cystoscopy, etc.). • Understand the structure, function, and safe operation of endoscopic equipment. • Explain the indications and contraindications for endoscopic procedures. • Understand the principles of patient preparation and post-procedure care. • Recognize the importance of infection prevention and patient safety in endoscopic practice.
Topics:

1. General principles in endoscopy
2. Special endoscopic imaging methods
3. Esophagogastroduodenoscopy
4. Colonoscopy
4. Endoscopy of the small bowels
5. ERCP: biliary endoscopy
6. ERCP: pancreatic endoscopy
7. Diagnostic and therapeutic endoscopic ultrasound
7. Therapy of early GI malignancies
9. Third space endoscopy
10. Performance measures in endoscopy. Endoscopic education
11. Visit in the Skill lab

Supporting methods to achieve learning outcomes:

- Theoretical lectures
- Scientific papers
- Endoscopic videos
- Skill laboratory
- Observation of endoscopic examinations

Evaluation of the acquisition of expected learning outcomes:

Attendance of the lectures and practicals is mandatory. A maximum of 2 absences is allowed. In case of more than two absences, a certification about the absences should be presented. In case you are unable to attend the lecture, please send an email no later than the day before the lecture. There is no possibility to replace the lectures or practicals. The course ends with an oral exam.

Mandatory reading list: -

Recommended reading list:

ESGE guidelines: https://www.esge.com/publications/guidelines