PATHOLOGY	
GENERAL INFORMATION	
Course coordinator	Assistant Professor Boris Dumenčić, MD, PhD
Assistant/Associate	Professor Branko Dmitrović, MD, PhD Assoc. Prof. Milanka Mrčela, MD, PhD Asst. Prof. Jasmina Rajc, MD, PhD Sandra Nekić MD Zlatka Radičević MD Andrej Kovačević MD Irena Zagorac, MD
Study Programme	Integrated undergraduate and graduate university study of Medicine
Status of the course	Mandatory
Year of study, semester	3rd year; 5th and 6th semester
ECTS	**17**
Workload (hours)	Lectures (30); Seminars (75); Exercises (75)
Expected number of students	70
COURSE DESCRIPTION	
Course objectives	
The student will be trained to recognize morphological changes in cells, tissues, and organs. This will provide a better understanding of the causes and mechanisms of disease development and facilitate understanding of the functional consequences of morphological changes. During the course, the student acquires knowledge and skills in the application of the nomenclature of pathologic concepts and diseases in Latin.	
Enrolment requirements and entry competencies	
It is necessary to acquire 51 ECTS credits from the previous years of the study program.	
Learning outcomes at the Programme level	
1.1; 1.2; 2.1; 3.1; 3.3; 4.2	
Learning outcomes (5-10)	
After the students have attended lectures and exercises, written and presented seminars papers, studied independently, and passed the exam, they will be able to: 1. Independently recognize, critically evaluate, and interpret the macroscopic morphology of changes in various pathologic conditions 2. Identify and evaluate histologic changes (microscopic morphology) in various pathologic conditions 3. Integrate and apply the acquired theoretical and practical knowledge to successfully master other clinical courses during their studies 4. To apply the acquired knowledge in independently solving practical problems of the future physician 5. Competently master the terminology (nomenclature of pathologic concepts) necessary for communication with fellow students, faculty, and future colleagues.	
Course content	

General Pathology: Processes of adaptation, cell damage and cell death, acute and chronic inflammation, repair, regeneration and healing, hemodynamic disorders, genetic disorders, immune disorders, neoplasms, and environmental pathology as follows:

(L) Cellular pathology. Introduction. Cellular damage. Reversible cellular damage. Excessive accumulation of metabolites and other substances.
(S) Cellular adaptations. Irreversible cellular damage.
(E) Fatty metamorphosis of the liver. Caseous necrosis in a lymph node. Enzymatic necrosis of adipose tissue in the pancreas. Liver hemosiderosis.

(L) Inflammation. Introduction. Classification of inflammation. Classic signs of inflammation. Components of the inflammatory response. Chemical mediators of inflammation.
(S) Acute inflammation. Disorders of leukocyte function. Consequences of acute inflammation. Chronic inflammation. Morphological forms of acute and chronic inflammation. Systemic signs of inflammation.
(E) Acute pneumonia. Fibrinoid inflammation of the arterial wall in the kidney. Myocardial abscess. Granulations. Inflamed nasal polyp. Granulomatous inflammation in the lungs. Chronic inflammation of the salivary gland. Nonspecific follicular lymphadenitis.

(L) Immune system disorders. Introduction. Hypersensitivity reactions. Transplantation reaction.
(S) Autoimmune diseases. Immunodeficiency states. Amyloidosis.
(E) Rheumatoid nodules. Systemic lupus erythematosus. Renal amyloidosis. Kaposi's sarcoma.

(L) Disorders of body fluids and hemodynamics. Introduction. Embolism. Infarction. Shock.
(S) Edema. Dehydration. Hyperemia and congestion. Hemorrhage. Hemostasis and thrombosis.
(E) Pulmonary edema. Thrombosis. Hemorrhagic pulmonary infarction. Acute tubular necrosis.

(L) Neoplasms. Introduction. Classification of neoplasms.
(S) Biology of tumor growth. Epidemiology of neoplasms. Carcinogenesis and carcinogens. Molecular pathology of neoplasms. Tumor immunity. Clinical characteristics of neoplasms. Laboratory diagnostics in oncology.
(E) Metaplasia. Dysplasia. Carcinoma in situ. Invasive carcinoma. Well-differentiated carcinoma. Poorly differentiated carcinoma. Lymphatic expansion of the tumor. Lymph nodes metastases.

(S) Developmental and genetic diseases and childhood illnesses. Introduction. Errors of morphogenesis. Chromosomal disorders. Genetic disorders inherited according to Mendelian genetics. Genetic syndromes with atypical patterns of inheritance. Multifactorial (polygenic) inheritance.
(E) Neurofibroma. Cystic fibrosis of the pancreas. Gout. Hyaline membranes of the lungs.

(S) Autopsy technique. Basic techniques for performing an autopsy, autopsy instruments, major changes on the body of the deceased, and techniques for performing an autopsy of each organ system.

(S) Neonatal diseases. Birth injuries. Fetal erythroblastosis. Sudden infant death syndrome. Infancy diseases.

(E) Autopsy 1: Signs of death, autopsy instruments, major changes on the body of a deceased, techniques for performing the autopsy of individual organ systems, identifying pathomorphological changes and their integration into the autopsy report.

(S) Pathology - the gateway to the future of medicine. Introduction. Teamwork. Subspecialties of pathologists. Development of new methods and models of research work. IT networking. New conceptual discoveries. Personalized medicine.
(E) Renal actinomycosis. Pneumocystis pneumonia. Esophageal moniliasis. Cat scratch disease.

(S) Techniques in pathology. Introduction. Histology laboratory. Intraoperative biopsies. Cytology laboratory. Immunohistochemistry laboratory. Electron microscopy laboratory. Molecular pathology laboratory. Flow cytometry.

(E) Autopsy 2: Signs of death, autopsy instruments, major changes on the body of a deceased person, techniques for performing the autopsy of individual organ systems, identifying pathomorphological changes and their integration into the autopsy report.

Organs and organ systems pathology: Pathology of the cardiovascular system, respiratory system, hematopoietic system, digestive system, liver, pancreas, kidneys, male and female reproductive system, breast, endocrine system, skin, bones and joints, peripheral nerves, muscles, and central nervous system as follows:

(L) Diseases of the blood vessels. Introduction. Arteriosclerosis. Hypertension and hypertensive vascular diseases. Inflammatory diseases.
(S) Aneurysms. Venous diseases. Diseases of the lymphatic vessels. Tumors of the blood and lymphatic vessels. Pathological changes due to therapeutic procedures in blood vessel diseases. Heart conditions. Introduction. Heart failure. Congenital heart defects. Hypertensive heart disease. Ischemic heart disease. Diseases of the endocardium and heart valves. Primary myocardial diseases. Pericardial diseases. Cardiac tumors. Heart transplantation.
(E) Early atherosclerosis. Late atherosclerosis. Hemangioma. Lymphangioma. Recent myocardial infarction. Myocardial scar. Acute rheumatic endocarditis. Bacterial endocarditis. Fibrinoproductive pericarditis. Endocardial fibroelastosis. Myocarditis. Atrial myxoma.

(E) Autopsy 3: Signs of death, autopsy instruments, major changes on the body of a deceased person, techniques for performing the autopsy of individual organ systems, identifying pathomorphological changes and their integration into the autopsy report.

(L) Respiratory system diseases. Introduction. Congenital lung anomalies. Pulmonary atelectasis. Vascular and circulatory lung diseases. Chronic obstructive pulmonary diseases.
(S) Overview of types of pneumonia. Restrictive lung diseases. Lung tumors. Pleural disorders. Mediastinal diseases.
(E) Bronchial asthma. Chronic bronchitis. Bronchiectasis. Abscessing bronchopneumonia.

(S) Head and neck disorders. Diseases of the nose and paranasal sinuses. Diseases of the pharynx, larynx, and trachea. Ear diseases. Eye diseases.
(E) Interstitial pneumonia. Squamous cell carcinoma of the bronchi. Microcellular carcinoma of the bronchi. Carcinoid.

(L) Diseases of the hematopoietic organs and lymph nodes. Introduction. Non-Hodgkin's lymphoma. Hodgkin's lymphoma. Neoplasms of histiocytes and dendritic cells.
(S) Anemia. Polycythemia. Bleeding disorders. White blood cell disorders. Malignant diseases of the bone marrow. Lymphadenitis and lymphadenopathy.
(E) Chronic myeloid leukemia. NHL – B-cell, follicular, grade II. NHL – B-cell, diffuse, large-cell. Hodgkin's lymphoma – nodular sclerosis.

(L) Diseases of the digestive system. Introduction. Pathology of the oral cavity and jaws. Diseases of the jaw bones and teeth. Salivary gland diseases. Salivary glands. The esophagus.
(E) Epulis. Mucocele. Pleomorphic adenoma. Warthin's tumor.
(S) Stomach and duodenum. Appendicitis.
(E) Chronic atrophic gastritis. Peptic ulcer. Early gastric cancer. Acute purulent appendicitis.
(S) Small and large intestines. Abdominal tract.
(E) Crohn's disease. Tubular adenoma. Villous adenoma. Colorectal cancer.

(L) Diseases of the liver and biliary system. Introduction. Clinical evaluation of the liver and liver diseases. Vascular liver diseases. Infectious inflammatory liver diseases. Chronic hepatitis. Toxic hepatitis.
(S) Immune liver diseases. Liver cirrhosis. Liver tumors and related lesions. Diseases of the gallbladder and bile ducts.
(E) Chronic persistent hepatitis. Chronic active hepatitis. Liver cirrhosis. Hepatocellular carcinoma.
(S) Diseases of the pancreas. Introduction. Developmental disorders. Inflammatory diseases. Diabetes. Neoplasms of the exocrine part of the pancreas. Pancreatic neuroendocrine tumors.
(E) Cholangiocellular carcinoma of the liver. Chronic inflammation of the gallbladder. Gallbladder cancer. Pancreatic cancer.

(L) Renal and urologic diseases. Introduction. Glomerular diseases.
(E) Rapidly progressive glomerulonephritis. Membranoproliferative glomerulonephritis. Purulent abscessing pyelonephritis. Chronic pyelonephritis. Nodular and diffuse glomerulosclerosis. Renal cell carcinoma. Bladder papilloma. Invasive bladder cancer.
(S) Developmental disorders. Tubulointerstitial kidney disease. Diseases of the renal blood vessels. Renal tumors. Urolithiasis. Diseases of the ureter, bladder, and urethra.

(L) Diseases of the male reproductive system. Introduction. Developmental disorders. Inflammatory diseases. Circulatory disorders. Infertility. Neoplasms.
(E) Seminoma. Teratocarcinoma. Benign prostatic hyperplasia. Prostate cancer.

(E) Autopsy 4: Signs of death, autopsy instruments, major changes on the body of a deceased, techniques for performing the autopsy of individual organ systems, identifying pathomorphological changes and their integration into the autopsy report.

(L) Diseases of the female reproductive system. Introduction. Development and developmental disorders. Inflammatory diseases of the lower female genital system. Vulva. Vagina. Cervix.
(S) Uterine trunk. Fallopian tubes. Endometriosis. Ovary. Selected pathological changes of the placenta and pregnancy disorders.
(E) CIN III. Endometrial cancer. Graviditas tubaria. Adenomyosis. Cystadenocarcinoma papillare serosum ovarii. Cystadenocarcinoma mucinosum ovarii. Krukenberg tumor. Mola hydatidosa.

(L) Diseases of the breast. Introduction. Developmental disorders of the breast. Mastitis. Fibrocystic changes and proliferative breast diseases. Breast tumors. Stromal tumors of the breast. Pathology of the male breast.
(E) Fibroadenoma. Fibrocystic breast change. Invasive ductal carcinoma. Invasive lobular carcinoma.

(S) Diseases of the endocrine system. Introduction. Pituitary gland. Thyroid gland. Parathyroid glands. Adrenal glands. Multiple endocrine neoplasia.
(E) Papillary thyroid carcinoma. Follicular carcinoma of the thyroid gland. Neuroblastoma. Pheochromocytoma.

(S) Skin diseases. Introduction. Congenital skin diseases. Diseases caused by physical environmental factors. Infectious diseases. Immune diseases. Cutaneous manifestations of diseases of internal organs. Idiopathic skin diseases. Cutaneous adnexal neoplasms.
(E) Nipple. Basal cell carcinoma. Nevus. Malignant melanoma.

(S) Diseases of bones, joints, and soft tissues. Introduction. Disorders of bone development. Osteonecrosis. Osteomyelitis. Metabolic diseases. Bone fractures. Neoplasms. Joint diseases. Tumors of the soft tissues.
(E) Osteochondroma. Osteosarcoma. Ewing's sarcoma. Bone metastases.

(S) Peripheral nerve and skeletal muscle diseases. Introduction. Basics of pathological response. Diseases of the peripheral nerves. Diseases of skeletal muscles. neuromuscular disorders.

(L) Diseases of the nervous system. Introduction. General pathology of the central nervous system. Cerebrovascular diseases.
(S) Developmental disorders of the central nervous system. Trauma. Neoplasms. Infectious diseases. Demyelinating diseases. Neurodegenerative diseases.
(E) Encephalomalacia. Acute purulent meningitis. Meningioma. Glioblastoma.

(E) Autopsy 5: Signs of death, autopsy instruments, major changes on the body of a deceased, techniques for performing the autopsy of individual organ systems, identifying pathomorphological changes and their integration into the autopsy report.

Mode of teaching

Lectures; Seminars; Exercises

Student obligations

Students are expected to attend all class sessions, as well as to take all the examinations. However, they are allowed for excused absences, totaling 30% of all classes. If there is an exercise a student hasn't done, it needs to be completed and graded additionally.

Monitoring student work *(alignment of learning outcomes, teaching methods, and grading)*

Teaching activity	ECTS	Learning outcome	Student activity	Assessment methods	Grade points	
					Min.	Max.
Class attendance	1,0	1-5	Class attendance	Evidence sheet	1	6
Exercises	1,0	1-5	Attendance and active participation in exercises	Evidence sheet	1	6
Seminars	2,0	1-5	Preparation of a seminar paper	Presentation of the seminar paper	2	11
1st revision/partial exam (P1, General Pathology + practical exam)	2,0	1-5	Continuous learning during classes	Written revision exam and practical exam	2	11
2nd revision/partial exam (P2, Special Pathology + practical exam)	2,0	1-5	Continuous learning during classes	Written revision exam and practical exam	2	11
Oral exam	9,0	1-5	Preparation for the oral exam	Oral exam	42	55
Total	**17**				**50**	**100**

P1 and P2 revision/partial exams are considered successfully passed when a student scores > 60% of the correct answers on the written exam and passes the practical exam.

Calculation of final grade:
Based on the total sum of the points awarded during the course and the final exam, the final grade is determined according to the following distribution:
A – excellent (5): 80-100 grade points; B – very good (4): 70-79,99 grade points; C – good (3): 60-69,99 grade points; D – sufficient (2): 50-59,99 grade points

Required reading (available in the library and through other media)

Title	Number of copies in the library	Availability through other media
1. Damjanov I, Seiwert S, Jukić S, Nola M (ed.): Patologija, 5th edition. Zagreb: Medicinska naklada, 2018.	12	
2. Belicza M. Obdukcijska dijagnostika. Zagreb: Liber, 1987.	5	

Additional reading

1. Nola M, Damjanov I et al. Patologija – priručnik za pripremu ispita. Zagreb: Medicinska naklada, 2009.
2. Kumar V, Abbas AK, Aster JC. Robbins basic pathology. 10th ed. Elsevier Inc. Philadelphia, 2018.
3. Damjanov I, Jukić S. Atlas opće patologije. Zagreb: Medicinska naklada, 2002.
4. Jukić S, Damjanov I. Opća patologija. Zagreb: Medicinska naklada, 2002.
5. Kumar V, Cotran RS, Robbins SL. Osnove patologije. Zagreb: Školska knjiga, 1994.
6. Plamenac P. Obdukcioni praktikum i osnovi makrodijagnostike. Sarajevo: Glas medicinara

Course evaluation procedures
Anonymous, quantitative, standardized student survey providing feedback on the course as well as on the work of the course coordinators and their assistants/associates is being conducted by the QA Office of the Faculty of Medicine Osijek.
Note /Other
E-learning does not count towards course contact hours but is being used in teaching and comprises links to various web pages, as well as video and audio materials available on web pages.