

LABORATORY TECHNOLOGIES IN CYTODIAGNOSTICS	
GENERAL INFORMATION	
Course teacher	Assoc. Prof. Biljana Pauzar, MD, PhD
Associates	Adela Benkotić, MD
Study programme	Graduate University Study of Medical Laboratory Diagnostics
Course status	Elective
Year of study, semester	1 st year, 2 nd semester
ECTS credits	5
Form of teaching (number of classes)	Lectures: 35; Seminars: 20; Exercises: 15
Expected number of students attending the course	20
COURSE DESCRIPTION	
Course objectives	
Broaden the knowledge about clinical cytology and mastering specific skills to perform and organise work in cytodiagnostic laboratories.	
Course entry requirements and competencies needed for the course	
Completed courses at the Undergraduate Study Programme of Medical Laboratory Diagnostics or equivalent bachelor's degree (baccalaureate)	
Learning outcomes at study programme level	
1.1, 1.2, 2.1, 2.2, 2.3, 2.6, 3.1, 3.2	
Expected learning outcomes at course level	
After attending lectures, seminars, laboratory exercises, independent study and passing the exam, students will be able to: <ol style="list-style-type: none"> 1. explain the interdisciplinary approach to clinical cytology, the cytology team and the role of cytotechnologists in the organization of work. 2. describe in detail the methods of obtaining material for cytological analysis. 3. assess the adequacy of the sample for cytological analysis. 4. prepare cytological smears and "inprint" preparations. 5. process cytological preparations according to MayGrünwald-Giemsa and Papanicolaou 6. independently perform cytochemical and immunocytochemical tests. 7. choose methods for taking and processing cytological preparations in urology, hematology, gynecology, pulmonology, gastroenterology, endocrinology, infectious disease. 8. choose methods for taking and processing cytological preparations of the breast, cerebrospinal fluid, effusions and joint fluids. 9. critically evaluate the methods for collection and processing, know the mechanisms of quality control in the cytology laboratory, issue and archive findings and prepare computer data 	
Course content	
<p>Lectures: Clinical cytology then and now, interdisciplinary approach to diagnostics, education of cytologists and cytotechnologists. Organization of work at the Clinical Institute for Clinical Cytology; cytology team, documentation and archiving of cytology preparations and results/findings in the cytology laboratory. Methods of obtaining material for cytological analysis (aspiration, exfoliative, imprint cytology). Intraoperative cytological analysis. Methods of preparing cytological preparations (standard, LBC, cell block, sample fixation). Standard staining in aspiration and exfoliative cytodiagnosis. Cytochemical tests and their practical application. Immunocytochemical tests and their practical application. Methods in cytogenetics that can be applied in the cytology laboratory. Principles of cytological specimen analysis (substrate, morphology of normal cells, cell order, benign/malignant diagnostic parameters, malignancy criteria), final opinion and diagnosis.</p>	

Cytodiagnosis in gynecology. Cytodiagnosis in pulmonology (normal cells, inflammatory, non-tumor and tumor changes in respiratory samples, lung cancer cytology). Cytodiagnostics in hematology - acute leukemias, cytochemistry and immunocytochemistry of acute leukemias, lymphoproliferative diseases. Clinical application of cytodiagnostics in hematology. Cytodiagnosis in urology. New technologies in the diagnosis of urotract tumors. Cytodiagnostics in gastroenterology (salivary glands, alimentary canal, pancreas, liver). Cytodiagnosis in endocrinology.

Seminars: Control of the work in the cytology laboratory. Control of the technical processing of the sample. Automation in the cytology laboratory. Storage of preparations and results of analyses/findings. Microscopy - a method of screening cytological preparations. Pap test in the program of secondary prevention of cervical cancer. The value of the Pap test in the assessment of microbiological and hormonal status. Clinical application of cytology in pulmonology. Diagnostic value, advantages and disadvantages of cytological analysis of urine. EUS, ERCP – new methods of obtaining samples in gastroenterology. Clinical application of cytology in endocrinology

Laboratory exercises: Microscopy-screening of cytological preparations. Control of technical processing of samples. Storage of preparations and results of analyses/findings.

Forms of teaching

Lectures; seminars; practical work, independent assignments.

Students' responsibilities

Attendance is obligatory throughout all course forms, and the student has to attend all the exams. Student absence of up to 30% is considered acceptable in each teaching form. Practical work and seminars that were not completed have to be taken in the form of colloquiums. Student is obligated to attend all the exams.

Monitoring students' work (*Connecting learning outcomes, teaching methods and evaluation*)

Teaching activity	ECTS	Learning outcome	Student activity	Evaluation methods	Grade points	
					Min.	Max.
Attending classes (lectures, seminars)	1.5	1-9	Attendance,	Attendance records	5	10
			Seminar paper	Writing and presenting seminar paper	15	20
		5,6	Practical work	Submitted report	15	20
Final exam	3.5	1-9	Studying for final exam	Written exam	15	50
Total	5				50	100

Evaluation of written part of final exam

Percentage of correct answers (%)	Grade points
60.00-64.99	15
65.00-69.99	20
70.00-74.99	25
75.00-79.99	30
80.00-84.99	35
85.00-89.99	40
90.00-94.99	45

95.00-100

50

Formulating the final grade:

Grade points achieved in classes are combined with points achieved in the final exam. Grading in the ECTS system involves absolute grading and represents one's final achievement. Grades are numerically expressed as follows: 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

Assigned reading (available in the library and in other media)

Title	Number of copies in the library	Availability in other media
Audy-Jurković S. Ginekološka citologija. U: Šimunić V i sur. Ciglar V, Suchanek E, ur. Ginekologija. Zagreb: Naklada Ljevak; 2001, str.	10	
Relevant scientific and professional papers selected by teacher		On line

Further reading

1. Halbauer M, Šarčević B, Tomić Brzac H: Citološko-patohistološki atlas bolesti štitne žlijezde i doštitnih žlijezda s ultrazvučnim slikama. (selected chapters) Nakladni zavod Globus, Zagreb 2000.
2. Cibas ES., Ducatman BS. Cytology: Diagnostic Principles and Clinical Correlates. 3rd Ed. Saunders Elsevier, 2009.
3. Koss LG., Melamed MR. Koss Diagnostic Cytology and Its Histopathologic Bases, 5th ed, Lippincott Williams & Wilkins, 2006
4. Marshall A. Lichtman, William Joseph Williams: Williams hematology, 6 th edition, McGraw-Hill, Medical Pub. Division, 2006
5. Geisinger KR. Modern Cytopathology. Churchill Livingstone, 2004.
6. Orell SR., Sterrett GF, Whitaker D. Fine Needle Aspiration Cytology. Elsevier Churchill Livingstone, 2005.

Quality assurance methods that ensure the acquisition of exit competencies

Anonymous, quantitative, standardised students' opinion survey on the course and teacher's work, carried out by the Quality Assurance Office of the Faculty of Medicine in Osijek