SUBJECT OUTLINE

1. Programme of study description

1.1.	THE "CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY
1.2.	THE FACULTY OF MEDICINE / THE CLINICAL DEPARTMENT – 14
1.3.	DISCIPLINE: CLINICAL TOXICOLOGY
1.4.	DOMAIN OF STUDY: Healthcare – regulated sector within the EU
1.5.	CYCLE OF STUDIES: BACHELOR'S DEGREE
1.6.	PROGRAMME OF STUDY: MEDICINE

2. Subject description

2.1.	Name of the subject/compulsory subject/elective subject within the discipline: CLINICAL TOXICOLOGY
2.2.	Location of the discipline: Bucharest Clinical emergency Hospital, 2-8 Floreasca Way
2.3.	Course tenured coordinator: 1. Head of Discipline Assoc.prof. dr. RADU CIPRIAN TINCU – 42 y – 12 years seniority in teaching activity 2. Assoc.prof.dr. MIHAIL SILVIU TUDOSIE – 56 y – 28 years seniority in teaching activity 3. Sen. lecturer dr. OANA RUXANDRA AVRAM – 52 y – 20 years seniority in teaching activity
2.4.	Practicals/clinical rotations tenured coordinator: 1. Head of Discipline Assoc.prof.dr. RADU CIPRIAN ȚINCU – 42 y – 12 years seniority in teaching activity 2. Assoc.prof.dr. MIHAIL SILVIU TUDOSIE – 56 y – 28 years seniority in teaching activity 3. Sen. lecturer dr. OANA RUXANDRA AVRAM– 52 y – 20 years seniority in teaching activity 4. Asist.prof.dr. BOGDAN MIHAI OPRIȚA – 52 y – 15 years seniority in teaching activity 5. Asist.prof.dr. LAURA CONSTANTINESCU - 36 y – 2 years seniority in teaching activity

2.5. Year of study	V	2.6. Semester	I; II	2.7. Type of assessment	Oral	2.8. Subject classification	Compulsory

3. Total estimated time (hours/semester of didactic activity) – teaching module

Number of hours per week	8	Out of which: 3.2 course	8	Clinical rotation	8
Total number of hours from curriculum		Out of which: 3.5 course	256	Clinical rotation	256
Distribution of allotted time	32 weeks		4 h/day		4 h/ day
Study from textbooks, courses, bibliography, and student notes					
Additional library study, study on specialized online platforms and field study					
Preparing seminars / laboratories, assignments, reports, portfolios and essays					
Tutoring					
Examinations					
Other activities					
Total hours of individual study					
Number of credit points					

4. Prerequisites (where applicable)

4.1. of curriculum	Fundamental knowledge of physiology, biochemistry, semiology, pharmacology, physiopathology
4.2. of competencies	

5. Requirements (where applicable)

5.1. for delivering the course	Computer, video projector, textbook of clinical toxicology
5.2. for delivering the clinical rotation	Bucharest Emergency Clinical Hospital ICU 2 Ward Emergency Department

6. Acquired specific competencies

Professional competencies (expressed through knowledge and skills)	At the end of the course the student must: 1. to describe the mechanisms of general acute toxicity by types of poisoning; 2. to know the parameters of acute toxicity, mutagenicity, toxicogenomics and carcinogenesis; receptors and specific interactions with toxicodynamic receptors; 3. to know the information related to general 4. stabilization measures in acute intoxications; 5. to have notions about measures to increase the 6. elimination of a toxic substance 7. to know the main antidotes and antidote mechanisms with great specificity; 8. to know and describe the main toxidromes; effects of xenobiotics on target organs (hematological, immunological, hepatic renal, pulmonary, brain, cardiovascular, dermal, endocrine). 9. to master notions about acute intoxications with 10. psychotropic substances, alcohols and glycols, metals, opiates; 11. to know the main measures of supporting therapy and monitoring in toxicological intensive care units Intoxication with psychoactive substances of abuse (depressants, stimulants, hallucinogens) 12. The new psychoactive substances - definitions, mechanisms of toxicity, diagnosis and treatment. 13. Toxic effects of heavy metals (lead, arsenic, mercury) 14. Air pollution 15. Effects of microplastic
Transversal competencies (of role, of professional and personal development)	1. To demonstrate concern for professional improvement by training clinical thinking skills; 2. To demonstrate involvement in scientific activities, such as the elaboration of specialized articles and studies; 3. To participate in projects having a scientific character, compatible with the requirements of integration in European education; 4. Upon completion of the course, the student must have the following communication skills: • Regarding professional behavior - to demonstrate a professional attitude towards the

	patient and the working team - to coordinate the activity in the Toxicology ICU, in close collaboration with the average staff - establish and maintain a safe work environment, considering the risks of contamination or injury with specific instruments - to know the importance of continuous medical education in order to develop their professional capacities based on current scientific data • Regarding ethical behavior - to apply the ethical principles related to medical practice - to respect patients' rights - to give priority to those treatment options that meet the patient's individual needs - to respect patients and colleagues without discrimination - to comply with the legal, administrative procedures and directions of conduct in medical practice • Regarding ability to communicate and relate - acquire and use medical vocabulary correctly - to communicate with the patient and his/her relatives - to interrelate with doctors of other specialties - to maintain a constructive, stress-free working atmosphere

7. Subject learning objectives (based on the scale of acquired specific competencies)

7.1. General learning objective	Acquiring notions and knowledge necessary to establish etiopathogenesis and diagnosis of acute intoxications. - the acquisition of notions and knowledge, skills, behaviors, attitudes, abilities and values necessary for medical practice in the field of clinic and intensive therapy. - acquiring the values of medical and human ethics, the ethical norms of caring for intoxicated patients and the methods of relating to patients and their families. - making correlations between the notions of the Clinical Toxicology course and the previous medical experience - the assessment of student performance must be based on the periodic and final assessment of the level of knowledge and skills - knowing the objectives
7.2. Specific learning objectives	Upon completion of the course, the student will be able to: - understand, define and know the mechanisms of acute toxicity; - know the clinical-paraclinical aspects in acute intoxications; - acquire notions about the therapeutic methods used in acute intoxications; - has knowledge of toxicological analytical laboratory methods; - acquire notions related to antidotes and antidote mechanisms;

8. Content

8.1. Course	Teaching methods	Observations
Course 1: 1. Introduction - definitions, the purpose of toxicology, sources of toxic substances, the site of action of toxic substances, notions of forensic toxicology. 2. Effects of xenobiotics exposure - idiosyncratic reaction, immediate toxicity versus delayed toxicity, reversible versus irreversible toxic effects, interaction between chemicals, tolerance mechanism, addiction mechanism. 3. Characteristics of toxic exposure - toxicity mechanisms, classification of poisoning (acute, subacute, chronic), factors that modulate toxicity, route of exposure, dose-effect relationship. 4. Mechanisms of toxicity - distribution (absorption vs pre-systemic elimination, distribution to target areas, excretion vs reabsorption, metabolic activation vs detoxification), reaction of the last toxicant with target molecules (types of reactions, toxic effects on target molecules), cellular dysfunction, mechanisms of repair. 5. Absorption, distribution, excretion. 6. Mutagenicity, toxicogenomics and carcinogenesis associated with exposure to various xenobiotics.	Course presented orally with power-point slides	2 h
Course 2: 1. Stabilization of the intoxicated patient - emergency measures - basic/advanced life support (ABCD), indications for orotracheal intubation, management of seizures. 2. Decontamination measures - prevention of dermal absorption, induction of emesis, gastric lavage, activated charcoal, laxatives, enemas. 3. Plasma and urinary alkalinization, forced diuresis - Mechanisms of action. 4. Dialysis-principles, toxicological indications, types, contraindications and complications. 5. Antidotism. Antidotes. Definitions. Classification of antidotes according to their mechanism of action, antidotes: physical, chemical, pharmacological. Competitive/non-competitive antagonism, chelating agents. Classification of antidotes in relation to the urgency of their use. 6. Neurological assessment of the intoxicated patient - assessment scales, miosis, mydriasis, pupillary reflex. Other types of assessment. 7. Evaluation of the acid-base and electrolyte balance in the intoxicated patient - osmolar gap, anion gap, oxygen saturation gap, metabolic acidosis, electrolyte disturbances. 8. Rhabdomyolysis syndrome due to toxic causes. 9. Changes in thermal balance - hyperthermia, hypothermia.	Course presented orally with power-point slides	2 h
Course 3: 1. Hematological response to different xenobiotics.	Course presented orally with power-point	2 h

2. Immunological response to different xenobiotics. 3. Hepatic response to different xenobiotics. 4. Renal response to different xenobiotics. 5. Pulmonary response to different xenobiotics. 6. The response of the central nervous system to different xenobiotics. 7. Cardiovascular response to different xenobiotics. 8. Dermal response to different xenobiotics. 9. Endocrine response to different xenobiotics.	slides	
Course 4: 1. The cholinergic toxidrome. 2. The anticholinergic toxidrome. 3. The opioid toxidrome. 4. The sympathomimetic toxidrome. 5. The hypnosedative toxidrome. 6. The serotonin syndrome. 7. The malignant neuroleptic syndrome - malignant hypertemia.	Course presented orally with power-point slides	2 h
Course 5: 1. Benzodiazepines. Mechanisms of action, GABA receptor, classification, pathophysiology of acute intoxication, clinical manifestations, specific antidote. Antidote mechanism. Indications and contraindications. 2. Barbiturates. Mechanism of action, classification, early and late clinical manifestations in acute intoxication. Specific methods of increasing elimination. 3. Antidepressants. Mechanism of action, Specific clinical manifestations. Specific aspects in stabilization therapy. Increasing elimination. 4. Neuroleptics. Mechanisms of action. Clinical manifestations. Particular aspects of stabilization therapy and support therapy. 5. Opioids - mechanism of action, opioid receptors, pathophysiology of acute intoxication, antidote, opioid withdrawal syndrome. 6. Paracetamol. Clinical stages of acute intoxication - particularities. Antidotal therapy - mechanisms of action. 7. Acute intoxication with oral antidiabetics. 8. Acute iron poisoning-Mechanism of toxicity. Stages of acute intoxication. Chelator therapy. 9. Acute intoxication with drugs that alter coagulation. 10. Intoxication with cardiovascular drugs: beta-blockers, digoxin, antihypertensives.	Course presented orally with power-point slides	2 h
Course 6: 1. Acute poisoning with solvents and vapors - classification, pathophysiology of hydrocarbons poisoning, management of acute poisoning. 2.Ethanol. Stages of metabolic transformation. Clinical effects in different stages depending on the level of blood alcohol content. Principles of therapy in acute alcoholism.	Course presented orally with power-point slides	2 h

3. Methanol. Stages of metabolic transformation. Systemic clinical manifestations. Hemodialysis in acute methanol intoxication. Indications; efficiency. Antidotism. 4.Ethylene glycol. Stages of metabolic transformation. Clinical manifestations in different stages of intoxication. Hemodialysis in acute ethylene glycol poisoning: indications, efficiency. Antidotism. 5.Acute mushroom poisoning. 6.Chemical burns caused by corrosive and caustic substances. 7.Clinical-therapeutic complex aspects caused by snake bite and other venoms. 8.Acute poisoning with pesticides - classification, mechanisms of toxicity, physiopathology of poisoning, antidotes. 9.Acute nitrate/nitrite poisoning.		
Course 7: 1. Toxic effects induced by plants. 2.Intoxication with psychoactive substances of abuse (depressants, stimulants, hallucinogens) 3. The new psychoactive substances - definitions, mechanisms of toxicity, diagnosis and treatment. 4. Carbon monoxide. Mechanism of action. Systemic effects correlated with carboxyhemoglobin concentration. Antidotism. Antidote efficiency. 5. Cyans and hydrogen sulphide. Toxic mechanism. Clinical manifestations. Aspects of emergency therapy. Antidotism: purpose, method, means.	Course presented orally with power-point slides	2 h
Course 8: 1. Bioacceleration and bioaccumulation - principles. 2.Lead poisoning. Systemic effects. Chelator therapy. 3.Arsenic poisoning. Systemic effects. Chelator therapy. 4.Mercury poisoning. Systemic effects, chelator therapy. 5.Medium and long-term effects of heavy metals exposure 6. Air pollutants - sulfur dioxide, heavy metals, PM particles, nitrogen oxides, acrolein 7. The toxic effects of microplastic on the body.		
8.2. Clinical rotation	**Teaching methods**	**Observations**
CR 1: introduction to clinical toxicology; visit to the clinical department; the distribution of student groups to each teaching staff	Study carried out in the Intensive Care Unit, Emergency Department and the analytical toxicology laboratory	
CR 2: basic life support - demonstration training session - stabilization of intoxicated patients; basic therapeutic maneuvers necessary to stabilize vital functions		

CR 3: analytical diagnosis - working session in the Analytical Toxicology Laboratory; demonstrative performance of an analytical examination - processing of a biological sample for analytical examination; gas-chromatographic examination coupled with mass spectrometry; other methods of analytical diagnosis		
CR 4: evaluation of the intoxicated patient; evaluation of a state of coma; correlation of clinical aspects with analytical toxicological examination; anamnestic and clinical evaluation of patients addicted to drugs of abuse		
CR 5: evaluation of patients intoxicated with alcohol (ethyl alcohol, ethylene glycol, methanol);		
CR 6: evaluation of patients poisoned with carbon monoxide; clinical and paraclinical evaluation of posthypoxic encephalopathy state		
CR 7: clinical and paraclinical evaluation of patients intoxicated with organo-phosphorus and carbamic anticholinesterases;		
CR 8: evaluation of practical and theoretical knowledge		
Bibliography for course and clinical rotation		

9. Corroboration of the subject content with the expectations of the representatives of the epistemic community, professional associations, and major employers in the field of the programme of study

10. Assessment

Type of activity	**Assessment criteria**	**Assessment methods**	**Assessment weighting within the final grade**
Course	Acquiring theoretical knowledge	Oral exam	100%
Clinical rotation	Assessment of practical knowledge	Practical evaluation of the patient	Accepted/rejected
Minimum performance standard			
at least 50% of the questions related to the subjects on the exam note			

Date of filing	Signature of the course tenured coordinator	Signature of the seminar tenured coordinator
28.08.2024		

Date of approval in the Council of the Department:	Signature of the Head of the Department