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PROGRAM OF STUDY

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**MEDICAL UNIVERSITY - PLEVEN**  
**FACULTY OF MEDICINE**

**DEPARTMENT OF PHARMACOLOGY AND  
TOXICOLOGY  
SECTOR "TOXICOLOGY"**

**PROGRAM OF STUDY**

IN

**„CLINICAL TOXICOLOGY“**


**ENGLISH MEDIUM COURSE OF TRAINING**

**SPECIALTY OF MEDICINE**

**ACADEMIC DEGREE MASTER PROFESSIONAL QUALIFICATION**

**DOCTOR OF MEDICINE**

<b>Developed by:</b> Assoc. Prof. Dr. E. Barzashka, Ph.D. Head of Toxicology Clinic	<b>Approved by:</b> Prof. A. Asparuhov, DSc	<b>Endorsed by:</b> Faculty Council	<b>Copy № 1</b>
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**According to the unified state requirements:** Freely elective discipline

**According to the curriculum** of MU-Pleven:- Freely elective discipline

It is taught in the VII (seventh) semester

**Academic year 2019 - 2020**

**Total number of hours: Lectures - 15 academic hours.**

**Practical exercises - 15 academic hours**

**Total credits: 1**

**Teachers:**

**Assoc. Prof. Dr. Evgenia Barzashka, PhD**, Specialist in Clinical Toxicology and Pediatrics, Head of the Clinic of Clinical Toxicology University Hospital "Dr. Georgi Stranski" EAD-Pleven - 1st Clinical Base, 1st floor, tel. 064- 886-534;

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**Purpose and tasks of the training:**

Objective: Clinical Toxicology is a specialty that deals with the problem of acute exogenous poisoning - diagnosis, treatment and prevention. Its relevance is growing more and more in the face of the galloping urbanization, computerization and environmental disharmony of the modern world.


This requires students to have a good understanding of the material of Clinical Toxicology, as an independent medical science discipline that has an urgent nature and a multidisciplinary scope.

**Tasks:**

1. Students should get acquainted with the modern aspects of clinical toxicology, the different types of toxic agents with therapeutic, toxic and lethal doses, as well as the routes of penetration of toxic substances in the body, resorption, distribution, biotransformation and elimination.
2. Students should get acquainted with the main therapeutic methods in toxicology - detoxification and depuration of the entry door, of the humoral environment and antidote treatment.
3. Students should master the basic mechanisms of action in emergency situations, such as toxicological patients - resuscitation, organ protective means, symptomatic treatment and rehabilitation.
4. The curriculum includes the most common toxic agents leading to severe intoxications - drug poisoning, inorganic compounds, corrosive poisons, household preparations and agricultural poisons as intoxications with biological agents and plants.

**Forms of training:**

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- Lectures
- Practical exercises.

**Methods for monitoring the acquired knowledge:**

1. Current control:

At the beginning of each new exercise a brief discussion of the material from the previous exercise.

2. Final control:

A final assessment of the degree of acquiring the taught material at the end of the training, also taking into account the participation in the practical work during the exercises and the evaluation of the test will be conducted in the form of a written and oral exam.


**DISTRIBUTION OF THE STUDY MATERIAL BY TOPICS**

№	Topic	Lecture	Total Hours
1.	Modern aspects of clinical toxicology. Basic principles of toxicokinetics and toxicodynamics. Basic therapies in poisoning. Antidotes - specific and nonspecific.	1	2
2.	Differential diagnosis of coma in acute intoxications. Acute intoxication with cerebrototoxic drugs.	1	2
3.	Acute drug intoxication with - heroin, cocaine, amphetamines, designer drugs. Toxicomania.	1	2
4.	Acute poisoning with alcohols - ethanol, methanol and ethylene glycol. Acute poisoning with antabuse drugs.	1	2
5.	Acute poisoning with agricultural poisons - FOC, carbamates, pyrethroids and others. Acute poisoning with technical preparations - acids, alkalis.	1	2
6.	Acute intoxication with heavy metals and metalloids toxic gases. Intoxications with aromatic amines, aniline, nitro compounds and other methemoglobin educators and petroleum derivatives.	1	2
7.	Acute poisoning with biological poison - snake venom, arthropods, fish etc. Mushroom poisoning - irritative, faloidni, muscarinic, panterinic. Acute poisoning of herbal origin	1	2
8.	Acute poisoning with nicotinic acid, isonicotinic acid and their derivatives. Differential diagnosis of seizures at acute poisoning	1	1
	<b>TOTAL</b>	8	15

**LECTURE COURSE PLAN**

**1. Modern aspects of Clinical Toxicology. Basic principles of toxokinetics and toxodynamics. Basic therapeutic methods in poisoning. Antidotes - specific and non-specific (2 h Lecture).**

Subject and tasks of toxicology as medical science. Types of xenobiotics and specific peculiarities. Classifications of toxic agents. Toxic and lethal dose. Definition of toxicodynamics and toxicokinetics and the interrelation of the two processes during the exogenous intoxication. Pathways of the toxic substances penetration into the body, resorption, distribution,

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biotransformation, elimination. Toxicodynamics - characteristics of the main damage to the body in poisoning. Types of toxic effects, cell-molecular mechanisms of the toxic action. Regional toxicology centers.

Main therapeutic methods: Detoxification and depuration means and methods - depuration of the entry door, of the humoral environment; antidotes - specific and non-specific; mechanism of antidotes action; resuscitation measures; organ protective therapy, symptomatic treatment and rehabilitation.

## **2. Differential diagnosis of comatose conditions in acute intoxication. Acute poisoning with cerebrototoxic drugs - (2 hours lecture).**

A subject of toxicology is the exotoxic coma with a disturbance of consciousness under the influence of toxic substances of different origin. Degrees of consciousness disturbances - quantitative and qualitative - are viewed. Main clinical and diagnostic manifestations in the most common coma conditions. Emergency actions in coma cases.

Types of poisoning and main clinical manifestations in the different groups of drugs with cerebrototoxic action - sedatives and sleeping pills, neuroleptics, anxiolytics and antidepressants. Diagnosis, detoxication and depuration means and methods, antidote treatment. Impact of these drugs on the ability to drive vehicles.

## **3. Acute intoxication with drugs - heroin, cocaine, amphetamines, designer drugs. Drug abuse and addiction. - (2 hours Lecture).**

The main types of psychoactive substances are reviewed, according to the WHO (World Health Organization). Use, abuse and forming an addiction to psychoactive drugs. Changed tolerance and withdrawal. Main clinical manifestations in different types of psychoactive drugs. Drug addiction. Available tests on the pharmacy network. Opportunities for treatment, rehabilitation and social reintegration. European Monitoring Center for Drugs and Drug Addiction.

## **4. Acute alcohol poisoning - ethanol, methanol and ethylene glycol. Poisoning with antabus preparations - (2 hours Lecture).**


Ethanol poisoning - metabolism, clinical presentation, complications, treatment. Methyl alcohol poisoning - metabolism, clinical presentation, diagnosis and antidote treatment. Ethylene glycol (antifreeze) intoxication - metabolism, clinical presentation and antidote treatment. Antabuse drugs - course of acute poisoning. Chronic ethylism and addiction.

## **5. Acute poisoning with agricultural poisons - Organophosphorus compounds, carbamates, pyrethroids, etc. Acute poisoning with technical preparations - acids, alkalis - (2 hrs. Lecture).**

Types of agricultural poisons. Organophosphorus poisoning - mechanism of action, metabolism, clinical presentation and behavior. Combined antidote therapy. Poisoning with carbamates, thiocarbamates, pyrethroids, chlorophenoxyacetic acid derivatives and rodenticides - mechanism of action, clinical presentation, treatment. Corrosive poisoning with acids - organic and inorganic, characteristic clinical manifestations and treatment. Acute poisoning with alkalis - clinical presentation, treatment. Early and late complications of corrosive intoxication.

## **6. Acute intoxications with heavy metals and metalloids, toxic gases. Poisonings with aromatic amines, aniline, nitro compounds and other methaemoglobinizers and petroleum derivatives (2 hours lecture).**

Poisoning with the most common metals and their inorganic compounds - mercury, lead, copper, silver, sodium and potassium clinical manifestations and antidote treatment. Corrosive poisoning with inorganic acids and alkalis. Intoxications with organic compounds - petroleum derivatives, phenol, benzene and other preparations. Main clinical manifestations and treatment.

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Poisoning with aniline, nitrobenzene and other aromatic amines, which penetrate the human body through all entrance doors and are active methemoglobin generators. Clinical presentation and treatment of intoxications with carbon tetrachloride and dichloroethane. Acute intoxications with liquid fatty hydrocarbons - gasoline, kerosene, combustion gas and other derivatives - clinical presentation, treatment and complications.

**7. Acute poisoning with biological poisons - snake venom, arthropods, fish, etc. Mushroom poisoning - irritative, phalloid, muscarinic, pantherinic. Acute poisoning of plant origin (2 h. Lecture).**

Snakebites - first aid and behavior in exotoxic shock. Application of anti-snake serum (Snake venom antiserum). Poisoning with other biological agents - arthropods - bees, wasps, etc. Toxic effects on the human body of marine animals, fish, dinoflagellates, etc. - clinical picture and treatment.


Mushroom intoxications with a short latency period –irritative mushroom gastroenteritis, muscarinic mushroom intoxication, pantherinic and nitrous mushroom poisoning - clinical picture and treatment. Mushroom poisoning with a long latency period - phalloid mushroom intoxications - clinical picture, depuration therapy, antidote and hepatoprotective treatment.

**8. Poisonings with nicotinic acid, isonicotinic acid and their derivatives. Differential diagnosis of seizures in acute poisoning - (1 hour lecture).**

Acute exogenous intoxication with nicotinic acid, isonicotinic acid and isoniazid (rimicide, rimifin, etc.). Diagnostic criteria of psychoexcited symptoms, depuration and detoxification, antidote treatment. Differential diagnostic approach in exotoxic seizure symptoms. The most common poisonings that occur with seizures.

**Distribution of the material by topics for the practical exercises**

№	Topic	Total hours	Exercise
1.	Modern aspects of clinical toxicology. Basic principles of toxicokinetics and toxicodynamics. Basic therapies in poisoning. Antidotes - specific and nonspecific.	2	1
2.	Differential diagnosis of coma in acute intoxications. Acute intoxication with cerebrotoxic drugs.	2	1
3.	Acute drug intoxication with - heroin, cocaine, amphetamines, designer drugs. Toxicomania.	2	1
4.	Acute poisoning with alcohols - ethanol, methanol and ethylene glycol. Acute poisoning with antabuse drugs.	2	1
5.	Acute poisoning with agricultural poisons - OFC, carbamates, pyrethroids and others.	2	1
6.	Acute poisoning with technical preparations - acids, bases. Acute intoxication with heavy metals, metalloids and toxic gases.	2	1
7.	Acute poisoning with biological poison - snake venom, arthropods, fish etc. Mushroom poisoning - irritative, muscarinic, pantherinic and phalloides.	2	1
8.	Acute poisoning of herbal origin. Test	1	1
	<b>TOTAL</b>	<b>15</b>	<b>8</b>

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## PRACTICAL EXERCISES COURSE PLAN

### **1. Propaedeutic methods in toxicology. Diagnosis and differential diagnostic approach. Basic methods of treatment - detoxication and depuration, antidote means - (2 hours exercise). Emergency and immediate medical care for a toxicological patient – antidote means.**

Introducing the students to the basic propedeutic methods - toxicological case history, status, diagnosis and differential diagnostic approach. Mastering the basic detoxication and depuration methods. Application of antidote therapy - specific and non-specific.

### **2. Acute poisoning with cerebrototoxic drugs. Differential diagnosis of comatose conditions - (2 hours exercise).**

Providing emergency and immediate medical care to a toxicological patient - building practical skills. Reviewing of coma cases - differential diagnostic approach, laboratory tests, immunological tests and imaging diagnostics.

### **3. Acute intoxication with drugs - heroin, cocaine, amphetamines, designer drugs. Drug abuse and addiction.** - (2 hours exercise).

The main types of psychoactive substances are reviewed, according to the WHO (World Health Organization). Use, abuse and forming an addiction to psychoactive drugs. Changed tolerance and withdrawal. Main clinical manifestations in different types of psychoactive drugs. Drug addiction. Available tests on the pharmacy network. Opportunities for treatment, rehabilitation and social reintegration. European Monitoring Center for Drugs and Drug Addiction.

### **4. Acute alcohol poisoning - ethanol, methanol and ethylene glycol. Clinical picture and treatment in intoxications with psychoactive substances. Diagnostic tests - (2 hours exercise).**

Reviewing clinical cases of alcohol and psychoactive substances poisoning, application of specific and non-specific antidotes, toxic effects of antabus drugs. Diagnostic tests for drugs and working with them. Therapeutic centers for addicts - types, conditions for admission and treatment.

### **5. Acute poisoning with agricultural poisons - Organophosphorus compounds, carbamates, pyrethroids, etc.**


Therapeutic behavior in poisonings with Organophosphorus compounds – immediate therapy, combined antidote treatment. Introducing the students to the manifestations of cholinergic syndrome - differential diagnosis of toxic pulmonary edema, cholinergic manifestations and seizure syndrome. Reviewing clinical cases of intoxication with carbamates, pyrethroids and rodenticides.

### **6. Corrosive intoxications. Acute intoxications with heavy metals and metalloids, toxic gases. (2 hours exercise).**

Introduction to the main manifestations of intoxications with corrosive preparations - acids and alkalis, differential diagnostic criterias, behavior, early and late complications. Poisoning with the most common metals and their inorganic compounds - mercury, lead, copper, silver, sodium and potassium clinical manifestations and behavior.

### **7. Acute poisoning with biological poisons - snake venom, arthropods, fish, etc. Acute poisoning of plant origin. Mushroom poisoning - irritative, phalloid, muscarinic, pantherinic. - (2 hours of exercise).**

Presentation of cases with mushroom intoxications with short and long latency period - possibility for differential - diagnostic errors. Phalloid mushroom intoxication - clinical and paraclinical syndrome, substitution therapy, antidotes. Snakebite - local and generalized reactions, first aid, behavior in a hospital setting, application of anti-snake serum. Complications. Poisoning

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with other biological agents - arthropods - bees, wasps, etc. Insect stings - local and generalized reactions. Anaphylactic shock.

Toxic effects on the human body of marine animals, fishs, dinoflagellates, etc. - clinical picture and behavior.

**8. Clinical cases with toxicallergic manifestations. Interview / conducting a test examination- (1 hour exercise).**

Reviewing cases with severe toxicallergic reactions of non-drug and drug type. Lyell's syndrome - toxic epidermal necrolysis. Interviewing students and conducting an exit test on the material.

**CONTROL METHODS**

**CURRENT CONTROL:**

During the seventh semester, students receive a test grade and / or a brief discussion-interview on the material from the previous exercise at the beginning of each exercise. In the student's **evaluation** is taken into consideration the handling of practical tasks during the classes.

**FINAL CONTROL:**

The Clinical Toxicology exam consists of 25 questions covering the entire study material. During the exam, students answer their questions in writing and answer additional questions orally. The final score is based on the assessments of the written examination, the mandatory day-to-day (current) control and the participation during the exercises. The final evaluation is complex and assesses the overall performance and acquired knowledge and skills during the training at the Department of Clinical Toxicology.

**CREDIT COLLECTION SYSTEM:**

Total credits: 1 (30 credits).

The total credit score is formed by:

1. Credits from attendance and participation in practical classes.
2. Credits from the presence at lectures.
3. Credits from independent preparation for practical exercises.
4. Credits from independent preparation for mandatory current control.
5. Credits from independent preparation for a semester exam.


1 credit of Clinical Toxicology corresponds to 30 points, distributed as follows:

Activities	Maximum Points	Maximum Credits	Percentage
Attendance and participation in practical exams	7 x 1 = 7	0,25	25
Attendance of lectures	7 x 1 = 7	0,25	25
Preparation for practical classes	7 x 0,3 = 2,1 (2)	0,125	12.5
Test examination and/or short discussion	6 x 1 = 6	0,125	12.5
Exam Preparation	8	0,25	25
Total:	30	1	100,0

**PLACE OF THE COURSE IN THE OVERALL TRAINING IN THE SPECIALTY:**

Clinical Toxicology is an optional subject in the curriculum of the specialty "Medicine" and is studied in VII semester.



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Acute poisonings are an emergency conditions and require timely, competent medical care, for which students need to acquire the necessary minimum of theoretical and practical skills to medically care for the toxicological patients.

### **EXPECTED RESULTS:**


The main result of the Clinical Toxicology training of the students at the Faculty of Medicine is the development of a stable cognitive base and practical skills in the examination and treatment of a toxicological patient. It is expected as a result of the systematic course in Clinical Toxicology, students to build professional thinking towards a clinical approach to the patient and a connection with the other clinical disciplines.

## **Synopsis**

### **of Clinical Toxicology**

1. Modern aspects of clinical toxicology.
  2. Main poisoning therapies.
  3. Antidotes – specific and nonspecific.
  4. Differential diagnosis of the exotoxic coma-Ethanol, Methanol, Etilenglikol.
  5. Differential diagnosis of the exotoxic coma – poisoning with drugs.
  6. Differential diagnosis of the exotoxic coma from opium, carbon dioxide and from Carbon monoxide.
  7. Inorganic compounds poisoning - heavy metals.
  8. Acute mushroom poisoning - short latency period long laten cyperiod.
  9. Acute mushroom poisoning – long latency period.
  10. Acid poisoning .
  11. Base poisoning.
  12. Acute drug intoxication - cannabis, heroin, cocaine – clinical course and therapy.
  13. Acute drug intoxication - amphetamines, hallucinogens designer drugs-clinical course and therapy.
  14. Acute drug intoxication – opium-clinical course and therapy.
  15. Acute poisoning: biological poison - snakes, arthropods.
  16. Acute alcohol poisoning – ethanol - metabolism, clinical course and therapy. Antabuse-alcoholic intoxication.
  17. Acute alcohol poisoning – methanol, ethyleneglicol-metabolism, clinical course and therapy.
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18. Acute pesticide poisoning (agricultural poisons) - organicphosphorus compounds.

19. Acute drug poisoning: treating CNS.

20. Acute drug poisoning: treating cardiovascular system.

### **Recommended readings:**

1. Lecture on clinical toxicology.
2. „Clinical Toxicology Principles and Mechanisms“ - 2nd Ed, Frank A. Barile, 2010
3. „Poisoning and Toxicology Handbook“ - 4th Ed, Jerrold B. Leiken and Frank P. Paloucek, 2007
4. „Modern Medical Toxicology“, V. V. Pillay, 2013

Head of Clinic of Clinical Toxicology:

Assoc. Prof. Evgenia Barzashka, MD, PhD