

**MEDICAL UNIVESRITY – PLOVDIV**  
**FACULTY OF PHARMACY**  
**DEPARTMENT OF PHARMACEUTICAL SCIENCES**

# **SYLLABUS**

**in**

**PHARMACEUTICAL CALCULATIONS**

**Approved by the Department Council - Protocol № 10/18.10.2024**

**Confirmed by the Faculty Council - Protocol № 09/13.11.2024**

# PHARMACEUTICAL CALCULATIONS

## Syllabus

Discipline	Final exam/ semester	According to the Faculty of Pharmacy curriculum of MU-Plovdiv Academic hours				ECTS	Academic hours in semester	
		Auditorium	Lectures	Practices	Non-auditorium		V semester	
							L	P
Pharmaceutical calculations	V	20	4	16	30	2	4	16

**DISCIPLINE:**

Pharmaceutical calculations

**TYPE OF DISCIPLINE ACCORDING TO THE UNIFORM STATE REQUIREMENTS:**

Optional

**LEVEL OF QUALIFICATION:**

MPharm

**FORMS OF TRAINING:**

Lectures, practicals

**YEAR OF TRAINING:**

III course

**DURATION OF TRAINING:**

One semester

**ACADEMIC HOURS:**

4 hours lectures, 16 hours seminars

**TECHNICAL EQUIPMENT APPLIED IN THE TRAINING:**

Multimedia presentations, discussions, individual tasks, preparation of papers

**FORMS OF EVALUATION:**

- Current assessment during the semester
- Semester exam

**EVALUATION CRITERIA:**

An average mark is formed on the basis of the grades from the current assessments during the semester and the theoretical exam.

**SEMESTER EXAM:**

Yes (theoretical exam – oral and written form)

**STATE EXAM:**

No

**LECTURER:**

Professor or assistant professor from the department of Pharmaceutical sciences.

**DEPARTMENT:**

Pharmaceutical sciences

**ANNOTATION**

This course focuses on the quantitative and qualitative principles, related to the calculations performed by pharmacists in different practical aspects. It covers basic principles and techniques that are used in pharmaceutical calculations, so students will acquire knowledge in pharmaceutical calculations and develop problem solving skills applicable to the pharmaceutical practice. The scope of the program mainly includes calculations related to prescription drugs. Typical situational problems are used in applying this knowledge to prescribing and treatment procedures.

The course develops a solid foundation for the principles of calculation and includes operations and application of ratios, proportions, percentages, etc. in the routine work of pharmacies (preparation of drugs, dosage, filling, pricing, stock control, dose calculation for parenteral formulations, dosage calculations based on weight and surface, intravenous infusion rate, dilutions, substitutions, etc.).

**BASIC AIMS OF THE DISCIPLINE**

Students will demonstrate the ability to perform pharmaceutical calculations required for routine dose determination and formulation of pharmaceutical preparations. Emphasis will be placed on basic calculations, the use of measuring equipment, dosage calculations.

**EXPECTED RESULTS**

After completing this course students will be able to:

- demonstrate competence in performing pharmaceutical calculations to ensure accuracy and precision and to minimize the risk of errors;
- interpret and apply commonly used abbreviations and symbols used in prescriptions to perform correct calculations.

**SYLLABUS**  
**III course, V semester**

<b>№</b>	<b>TOPIC</b>	<b>HOURS</b>	<b>FORM OF EDUCATION</b>
<b>1.</b>	Introduction to pharmaceutical calculations.	<b>2 h.</b>	lecture
<b>2.</b>	Systems of units. Pharmaceutical measuring units.	<b>2 h.</b>	lecture
<b>3.</b>	Density, replacement volume and replacement values.	<b>2 h.</b>	seminar
<b>4.</b>	Concentrations.	<b>2 h.</b>	seminar
<b>5.</b>	Dilutions.	<b>2 h.</b>	seminar
<b>6.</b>	Pharmaceutical dosage forms.	<b>2 h.</b>	seminar
<b>7.</b>	Calculation of doses – I.	<b>2 h.</b>	seminar
<b>8.</b>	Calculation of doses – II.	<b>2 h.</b>	seminar
<b>9.</b>	Calculations involving molecular weights. Parenteral solutions and isotonicity.	<b>2 h.</b>	seminar
<b>10.</b>	Selected calculations in modern pharmaceutical technology.	<b>2 h.</b>	seminar

**TOTAL: 20 h.**

## **LECTURES and SEMINARS – THESES**

### ***TOPIC № 1 – 2 hours***

#### **INTRODUCTION TO PHARMACEUTICAL CALCULATIONS.**

1. Rational numbers.
2. Proportions.
3. Ratios.
4. Fractions.
5. Percentages.
6. Calculation of missing value of two proportional sets.
7. Creating proportions for practical situations.

### ***TOPIC № 2 – 2 hours***

#### **SYSTEMS OF UNITS. PHARMACEUTICAL MEASURING UNITS.**

1. Weight units.
2. Measuring units.
3. Changing measuring units.
4. Changing measuring units from different measuring systems.

### ***TOPIC № 3 – 2 hours***

#### **DENSITY, REPLACEMENT VOLUME AND REPLACEMENT VALUES.**

1. Density.
2. Replacement volumes including solids in liquids.
3. Replacement values for solids included in other solids.

### ***TOPIC № 4 – 2 hours***

#### **CONCENTRATIONS.**

1. Substance amounts.
2. Weight-volume concentration.
3. Concentration in percentages.
4. Converting concentration from one form to another.
5. Calculating the amount of ingredient needed to prepare a solution with a certain concentration in percentage.

### ***TOPIC № 5 – 2 hours***

#### **DILUTIONS.**

1. Simple dilutions.
2. Serial dilutions.
3. Concentrates.
4. Titrated solutions.
5. Multiple dilutions.
6. Mixing of concentrates.

**TOPIC № 6 – 2 hours**

**PHARMACEUTICAL DOSAGE FORMS.**

1. Recalculation of the prescribed amount of dosage form (increase or decrease).

**TOPIC № 7 – 2 hours**

**CALCULATION OF DOSES – I.**

1. Dosage.
2. Dosage regimen.
3. Dosage based on the weight of the drug.
4. Dosage based on the number of doses.
5. Control for overdosing.
6. Dosage for renal dysfunction.

**TOPIC № 8 – 2 hours**

**CALCULATION OF DOSES – II.**

1. Doses for children.
2. Dosage according to age.
3. Dosage according to body weight.
4. Dosage according to body surface.
5. Selected clinical calculations.

**TOPIC № 9 – 2 hours**

**CALCULATIONS INVOLVING MOLECULAR WEIGHTS. PARENTERAL SOLUTIONS AND ISOTONICITY.**

1. Molecular weight of drugs.
2. Moles and millimoles; milliequivalents.
3. Flow rate of intravenous solutions.
4. Isotonicity.

**TOPIC № 10 – 2 hours**

**SELECTED CALCULATIONS IN MODERN PHARMACEUTICAL TECHNOLOGY.**

1. Dissolution of dry powders.
2. Use of prepared dosage forms.
3. Filling capsules and casting suppositories.
4. Calculations related to plant extractive substances.

## **BIBLIOGRAPHY**

1. Howard C. Ansel; Mitchil J. Stoklosa, *Pharmaceutical Calculations*, 13th ed. 2010, ISBN 978-1-58255-837-0
2. Savva Michalakis, *Pharmaceutical Calculations: a conceptual approach*, Springer, 2019, ISBN 978-3-030-20334-4

## **CONSPECTUS**

### **Pharmaceutical calculations**

1. Introduction to pharmaceutical calculations.
2. Systems of units. Pharmaceutical measuring units.
3. Density, replacement volume and replacement values.
4. Concentrations.
5. Dilutions.
6. Pharmaceutical dosage forms.
7. Calculation of doses.
8. Calculations involving molecular weight. Parenteral solutions and isotonicity.
9. Selected calculations in the modern technology of dosage forms.