



# **Pharmacy - Integrated Academic Studies**

**SECOND YEAR**

2025/2026.

**PHARMACEUTICAL TECHNOLOGY 1**

Subject:

## **PHARMACEUTICAL TECHNOLOGY 1**

The course is evaluated with 7 ECTS. There are 4 classes of active teaching per week (2 classes of lectures and 2 classes of work in a small group)

## TEACHERS AND ASSOCIATES:

| RB | Name and surname  | E-mail address                                                               | Title               |
|----|-------------------|------------------------------------------------------------------------------|---------------------|
| 1. | Ana Barjaktarevic | <a href="mailto:ana.radovanovickg@gmail.com">ana.radovanovickg@gmail.com</a> | Associate Professor |
| 2. | Snežana Cupara    | <a href="mailto:snezanacupara@yahoo.com">snezanacupara@yahoo.com</a>         | Full Professor      |
| 3. | Marina Tomovic    | <a href="mailto:marinapop@gmail.com">marinapop@gmail.com</a>                 | Full Professor      |
| 4. | Marijana Andjic   | <a href="mailto:andjicmarijana10@gmail.com">andjicmarijana10@gmail.com</a>   | Assistant Professor |
| 5. | Marko Simic       | simic.marko.kg@gmail.com                                                     | Teaching assistant  |

## COURSE STRUCTURE:

| Module | Module name                                                                                                                                       | Weeks | Lectures | Work in a small group | Teacher-supervisor module             |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|-----------------------|---------------------------------------|
| 1      | <b>I</b><br>Laboratory practices.<br>Pharmaceutical excipients.<br>Powders.<br>Liquid dosage forms.<br>Extractive preparations.                   | 8     | 2        | 2                     | Associate Professor Ana Barjaktarevic |
| 2      | <b>II</b><br>Semi- solid dosage forms.<br>Solid dosage forms.<br>Sterilization and preparation of aseptic and parenteral pharmaceutical products. | 7     | 2        | 2                     | Associate Professor Ana Barjaktarevic |
|        |                                                                                                                                                   |       |          |                       | $\Sigma 30 + 30 = 60$                 |

## EVALUATION:

**STUDENT'S PRE-EXAM ACTIVITY: 50 points**

**FINAL EXAM (Written): 50 points**

The student must pass both the pre-exam activity and the final exam. Students must achieve more than 50 percent of points on each of them in order to receive the passing grade. Passing the pre-exam activity is the requirement for taking the final exam. The final exam is in the form of a written test that covers the material from all 15 teaching units.

### Assessment method based on points earned:

| Grading system |               |                    |
|----------------|---------------|--------------------|
| Grade          | No. of points | Description        |
| 10             | 91-100        | Excellent          |
| 9              | 81-90         | Exceptionally good |
| 8              | 71-80         | Very good          |
| 7              | 61-70         | Good               |
| 6              | 51-60         | Passing            |
| 5              | < 51          | Failing            |

## LITERATURE:

| Textbook title                                                                                                                        | Authors                                       | Publisher                                           | the Library |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------|-------------|
| Pharmaceutical Compounding and Dispensing                                                                                             | Marriott JF, Wilson KA, Langley CA, Belcher D | Pharmaceutical Press, London, 2006                  |             |
| The art, science, and technology of pharmaceutical compounding.                                                                       | Allen LV.                                     | American pharmacists association, 4th edition, 2012 |             |
| Pharmaceutical compounding laboratory. Laboratory manual.                                                                             | Akala EO et al.                               | Howard University, Washington DC, 2012.             |             |
| Handbook of pharmaceutical manufacturing formulations                                                                                 | Flegeer C                                     | Washington: CRC Press, 2004                         |             |
| Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 11th Edition                                                           | Loyd A                                        | LWW Lippincott Williams and Wilkins. 2017           |             |
| Pharmaceutical Calculations                                                                                                           | Ansel H, Stockton J                           | LWW Lippincott Williams and Wilkins. 2016           |             |
| A Practical Guide to Contemporary Pharmacy Practice and Compounding, 4th Edition                                                      | Lester Elder D                                | LWW Lippincott Williams and Wilkins. 2017.          |             |
| All lectures can be found on the website of the Faculty of Medical Sciences: <a href="http://www.medf.kg.ac.rs">www.medf.kg.ac.rs</a> |                                               |                                                     |             |

# THE PROGRAM:

## FIRST MODULE

### TEACHING UNIT 1 (FIRST WEEK):

| Lectures: 2 classes                                                                                                                                                                          | Practice: 2 classes                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Introduction to Pharmaceutical Technology. Reference literature. Pharmaceutical Health Service. Regulations on the storage and labeling of pharmaceutical substances. Basics of biopharmacy. | Searching of reference literature, including the European Pharmacopoeia 10th edition and Martindale: The Complete Drug Reference. |

### TEACHING UNIT 2 (SECOND WEEK):

| Lectures: 2 classes                                                                                                   | Practice: 2 classes                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Powders as a solid dosage form. Dose and concentration checking, pharmaceutical calculations and preparation methods. | Methods and general principles used in the preparation of powders for internal and external use. Discussion of prescriptions that prescribe different types of powders. Practical compounding of powders. |

### TEACHING UNIT 3 (THIRD WEEK):

| Lectures: 2 classes                                                                                                      | Practice: 2 classes                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solutions as a liquid dosage form. Dose and concentration checking, pharmaceutical calculations and preparation methods. | Methods and general principles used in the preparation of solutions for internal and external use. Discussion of prescriptions that prescribe solutions. Practical compounding of solutions. |

### TEACHING UNIT 4 (FOURTH WEEK):

| Lectures: 2 classes                                                                                          | Practice: 2 classes                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Extractive preparations obtained by plant extraction, including decocts, infusions, macerates and tinctures. | Methods of extraction used for the preparation of products obtained by plant extraction. Discussion of prescriptions that prescribe different types of extractive preparations. Practical compounding of extractive preparations. |

### TEACHING UNIT 5 (FIFTH WEEK):

| Lectures: 2 classes | Practice: 2 classes |
|---------------------|---------------------|
|---------------------|---------------------|

|                                                                                                                                                                                                           |                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <p>Different types of water for pharmaceutical use.<br/>Packaging of the pharmaceutical products. Primary and secondary packaging. Types of packaging materials.</p> <p>TEACHING UNIT 6 (SIXTH WEEK):</p> | <p>Advantages and disadvantages of packaging materials. Packaging of liquid, semi-solid, and solid dosage forms.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|

| Lectures: 2 classes                                                                                                                           | Practice: 2 classes                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Suspensions and syrups as a liquid dosage form. Dose and concentration checking, pharmaceutical calculations, and preparation methods.</p> | <p>Methods and general principles used in the preparation of suspensions and syrups. Discussion of prescriptions that prescribe suspensions and syrups. Practical compounding of suspensions.</p> |

TEACHING UNIT 7 (SEVENTH WEEK):

| Lectures: 2 classes                                                                                                                                | Practice: 2 classes                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Liquid drug emulsions for external and internal use. Dose and concentration checking, pharmaceutical calculations, and preparation methods.</p> | <p>Methods and general principles used in the preparation of emulsions. Discussion of prescriptions that prescribe emulsions. Practical compounding of emulsions.</p> |

TEACHING UNIT 8 (EIGHTH WEEK):

| Lectures: 2 classes                                                                                                   | Practice: 2 classes                                                                      |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <p>Colligative properties of the solutions. Isotonic solutions. Isotonic calculation for infusions and eye drops.</p> | <p>Discussion of prescriptions that prescribe infusions and ophthalmic dosage forms.</p> |

## SECOND MODULE

### TEACHING UNIT 9 (NINTH WEEK):

| Lectures: 2 classes                                                               | Practice: 2 classes                                                         |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Sterilization. Classification of the methods of sterilization and depyrogenation. | Discussion of prescriptions that prescribe sterile pharmaceutical products. |

### TEACHING UNIT 10 (TENTH WEEK):

| Lectures: 2 classes                                                                                                                                          | Practice: 2 classes                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Semisolid dosage forms, including ointments, creams, gels and pastes. Dose and concentration checking, pharmaceutical calculations, and preparation methods. | Discussion of prescriptions that prescribe semisolid dosage forms. Practical compounding of semisolid products. |

### TEACHING UNIT 11 (ELEVENTH WEEK):

| Lectures: 2 classes                                                                | Practice: 2 classes                                  |
|------------------------------------------------------------------------------------|------------------------------------------------------|
| Basics of rheology properties of the liquid and semisolid pharmaceutical products. | Rheological behavior of pharmaceutical preparations. |

### TEACHING UNIT 12 (TWELFTH WEEK):

| Lectures: 2 classes                                                                                                                                       | Practice: 2 classes                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Suppositories. Lipophilic and hydrophilic bases for suppositories. Dose and concentration checking, pharmaceutical calculations, and preparation methods. | Discussion of prescriptions that prescribe suppositories. Practical compounding. |

### TEACHING UNIT 13 (THIRTEENTH WEEK):

| Lectures: 2 classes                                                                    | Practice: 2 classes                                 |
|----------------------------------------------------------------------------------------|-----------------------------------------------------|
| Tablets as a solid dosage form. Types of excipients and classification of the tablets. | Discussion of prescriptions that prescribe tablets. |

### TEACHING UNIT 14 (FOURTEENTH WEEK):

| Lectures: 2 classes | Practice: 2 classes |
|---------------------|---------------------|
|---------------------|---------------------|

|                                                                                                   |                                                                      |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Preparation methods and tablet testing.                                                           | Tablet formulations for discussion.                                  |
| TEACHING UNIT 15 (FIFTEENTH WEEK):                                                                |                                                                      |
| Lectures: 2 classes                                                                               | Practice: 2 classes                                                  |
| Capsules as a solid dosage form. Types of excipients, methods of preparation and capsule testing. | Hard and soft gelatin capsules. Capsule formulations for discussion. |