

COURSE OF STUDY Pharmacy

ACADEMIC YEAR 2023-2024

ACADEMIC SUBJECT *Medicinal and Toxicological Chemistry I*

| General information | |
|--|--|
| Year of the course | 3 rd |
| Academic calendar (starting and ending date) | I semester (25 September 2023 – 19 January 2024) |
| Credits (CFU/ETCS): | 9 |
| SSD | CHIM-08 |
| Language | Italian |
| Mode of attendance | <i>Mandatory attendance</i> |

| Professor/ Lecturer Course A-E | |
|--------------------------------|---|
| Name and Surname | Paolo Tortorella |
| E-mail | paolo.tortorella@uniba.it |
| Telephone | 080 5442735 |
| Department and address | Department of Pharmacy – Drug Sciences |
| Virtual room | Teams Room <i>uezgjk3</i> |
| Office Hours | Each day of the week, from Monday to Friday, from 9:00 to 19:00, an e-mail agreement required |

| Professor/ Lecturer Course F-N | |
|--------------------------------|---|
| Name and Surname | Enza Lacivita |
| E-mail | enza.lacivita@uniba.it |
| Telephone | 080 5442750 |
| Department and address | Department of Pharmacy – Drug Sciences |
| Virtual room | Teams Room <i>t9h1iy</i> |
| Office Hours | Each day of the week, from Monday to Friday, from 9:00 to 19:00, an e-mail agreement required |

| Professor/ Lecturer Course O-Z | |
|--------------------------------|---|
| Name and Surname | Giovanni Lentini |
| E-mail | giovanni.lentini@uniba.it |
| Telephone | 080 5442743 |
| Department and address | Department of Pharmacy – Drug Sciences |
| Virtual room | Teams Room <i>yqlztgo</i> |
| Office Hours | Each day of the week, from Monday to Friday, from 9:00 to 19:00, an e-mail agreement required |

| Work schedule | | | |
|---------------|----------|---|--|
| Hours | | | |
| Total | Lectures | Hands-on (laboratory, workshops, working groups, seminars, field trips) | Out-of-class study hours/ Self-study hours |
| 225 | 80 | 10 | 135 |
| CFU/ETCS | | | |
| 9 | 8 | 1 | |

| | |
|-----------------------------|--|
| Learning Objectives | The specific educational objectives of the course are to impart theoretical knowledge in the medicinal chemistry and toxicological fields, which allow graduates to face the entire sequence of the complex multidisciplinary process that starts from the structural design of drugs and, through the study of structure-activity relationships, aims at the optimization of the pharmacological profile concerning the interaction of drugs with the target biomolecules at the cellular and systemic level. |
| Course prerequisites | Basic knowledge of General Chemistry, Animal Biology, Physics, Organic Chemistry, Biochemistry, Anatomy, and Physiology. |

| | |
|---|---|
| Teaching strategy | |
| Expected learning outcomes in terms of | |
| Knowledge and understanding on: | <ul style="list-style-type: none"> ○ the area of interest of Pharmaceutical Chemistry (drug design and development); ○ nomenclature of drugs; ○ drug classifications; ○ drug metabolism; ○ main pharmacodynamic agents and psychotropic drugs used in Italy |
| Applying knowledge and understanding on: | <ul style="list-style-type: none"> ○ drawing the structure of drugs starting from their corresponding rational name; ○ the physicochemical properties of drugs; ○ identification of the main functional groups; |
| Soft skills | <ul style="list-style-type: none"> ● <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Recognize drugs based on their structure; ○ hypothesize the possible pharmacological effects of drugs based on the pharmacophoric elements identified ○ evaluation of structure-activity relationships (SAR) ○ prediction of the possible metabolic fate of xenobiotics based on their molecular constitution. ○ prediction of toxic effects and drug interactions ● <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ be able to describe the structure of drugs using the chemical-pharmaceutical jargon correctly; ○ be able to describe the pharmacokinetics and pharmacodynamics of the active ingredients and argue about them in a simple, clear, and rigorous way. ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ ability to obtain information from the Internet and textbooks to deepen and broaden the acquired knowledge in the medicinal chemistry domain. |
| Syllabus | |
| Content knowledge | <p>Classification of drugs and medicines according to the ATC system. Drug discovery and development. Methods for obtaining new drugs.</p> <p>The nomenclature of drugs.</p> <p>Role of the chemical-physical characteristics of the active ingredients: stereochemistry, acid/base properties, solubility, partition coefficient.</p> <p>Pharmacokinetics and chemical modifications that influence them.</p> <p>Pharmacokinetic parameters. Phase I and II metabolic reactions. Molecular mechanisms of drug action: the relationships between structure and affinity/activity. Chemical modifications affecting the pharmacodynamic phase. Interactions between a drug and the active site. The spatial form of the molecule and drug activity. Molecular mechanisms of drug action.</p> |

| | |
|------------------------------------|--|
| | Physiological neurotransmitters and their role in the peripheral and central nervous systems. Structure, activity, and side effects of drugs on the following receptor systems and the enzymatic systems related to them: cholinergic, adrenergic, dopaminergic, serotonergic, histaminergic, and opioid systems. Structure, activity, and side effects of drugs active on ion channels (anxiolytics, anticonvulsants, hypnotic-sedatives, local anaesthetics), and reuptake mechanisms (antidepressants). Proton pump inhibitors. Antihypertensives. Non-steroidal anti-inflammatory drugs. Antiallergic. General anaesthetics. |
| Texts and readings | <ul style="list-style-type: none"> ○ 1. Williams, D. A. & Lemke, T. L. Foye's Principi di Chimica Farmaceutica. Piccin. ○ 2. Gasco, A.; Gualtieri, F.; Melchiorre, C. Chimica Farmaceutica. CEA. ○ 4. Patrick, G. L. Introduzione alla Chimica Farmaceutica. EdiSES. ○ 3. Wermuth, C. -G. La Pratica della Chimica Farmaceutica. EdiSES. |
| Notes, additional materials | Exemplary Web sites: https://it.wikipedia.org https://pubchem.ncbi.nlm.nih.gov/ https://go.drugbank.com/ https://www.ebi.ac.uk/chembl/ |
| Repository | <ul style="list-style-type: none"> • Texts are merely suggested and most of the treated subjects are supported by educational materials that may be freely downloaded from the Internet (UniBA portal and TEAMS platform). |

| Assessment | |
|---------------------|--|
| Assessment methods | Oral exam |
| Assessment criteria | <ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ the area of interest of Pharmaceutical Chemistry (drug design and development); ○ nomenclature of drugs; ○ drug classifications; ○ drug metabolism; ○ main pharmacodynamic agents and psychotropic drugs used in Italy. • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ drawing the structure of drugs starting from their corresponding rational name; ○ the physicochemical properties of drugs; ○ identification of the main functional groups. • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ recognize drugs based on their structure; ○ hypothesize the possible pharmacological effects of drugs based on the pharmacophoric elements identified; ○ evaluation of structure-activity relationships (SAR); ○ prediction of the possible metabolic fate of xenobiotics based on their molecular constitution; ○ prediction of toxic effects and drug interactions. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ be able to describe the structure of drugs using the chemical-pharmaceutical jargon correctly; • <i>Communication skills</i> <ul style="list-style-type: none"> ○ be able to describe the pharmacokinetics and pharmacodynamics of the active ingredients and argue about them in a simple, clear, and rigorous way. • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ ability to obtain information from the Internet and textbooks to deepen and broaden the acquired knowledge in the medicinal chemistry |

| | |
|---------------------------------|--|
| | domain. |
| Final exam and grading criteria | The final score ranges from 18 (the minimum score to pass the exam) to 30 (<i>cum laude</i> when the candidate demonstrates complete knowledge of all topics, outstanding communication skills, and peculiar problem solving skills). |
| Further information | |
| | |