



General Information	
Academic subject	Medicinal and Toxicological Chemistry I
Degree course	<b>Pharmacy</b>
ECTS credits	9
Compulsory attendance	Yes
Language	Italian
Academic year	2021/22

Subject teacher		
Course A-E	Name Surname	Role
	<b>Paolo Tortorella</b>	<b>Associate Professor</b>
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Course F-N	Name Surname	Role
	<b>Enza Lacivita</b>	<b>Associate Professor</b>
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Course O-Z	Name Surname	Role
	<b>Giovanni Lentini</b>	<b>Associate professor</b>
	Mail address	Telephone number
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ECTS credits details	Area	SSD	CFU/ETCS
Basic teaching activities	CHEMICAL DISCIPLINES: 03/D1 – CHEMISTRY AND PHARMACEUTICAL, TOXICOLOGICAL, AND NUTRACEUTICAL-ALIMENTARY TECHNOLOGIES	CHIM/08	9

Class schedule	
Period	1 <sup>st</sup> SEMESTER
Year	3 <sup>rd</sup>
Type of class	FRONTAL LESSONS

Time management	
Hours	225
In-class study hours	90
Out-of-class study hours	135

Academic calendar	
Class begins	September
Class ends	January

Syllabus	
Prerequisites/requirements	Basic knowledge of General Chemistry, Animal Biology, Physics, Organic Chemistry, Biochemistry, Anatomy, Physiology, and Pharmacology



Expected learning outcomes	<p>Knowledge and understanding on:</p> <ul style="list-style-type: none"><li>○ the area of interest of Pharmaceutical Chemistry (drug design and development).</li><li>○ Nomenclature of drugs</li><li>○ Drug classifications.</li><li>○ Drug metabolism</li><li>○ Main pharmacodynamic agents and psychotropic drugs used in Italy.</li></ul> <p><i>Applying knowledge and understanding on:</i></p> <ul style="list-style-type: none"><li>○ drawing the structure of drugs starting from their corresponding rational name.</li><li>○ the physico-chemical properties of drugs.</li><li>○ Identification of the main functional groups.</li></ul> <p><i>Making informed judgments and choices:</i></p> <ul style="list-style-type: none"><li>○ Recognize drugs on the basis of their structure;</li><li>○ Hypothesize the possible pharmacological effects of drugs on the basis of the pharmacophoric elements identified.</li><li>○ Evaluation of structure-activity relationships (SAR).</li><li>○ Prediction of the possible metabolic fate of xenobiotics on the basis of their molecular constitution.</li><li>○ Predict toxic effects and drug interactions</li></ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"><li>○ Be able to describe the structure of drugs using the chemical-pharmaceutical jargon correctly</li><li>○ Be able to describe the pharmacokinetics and pharmacodynamics of the active ingredients and argue about them in a simple, clear, and rigorous way.</li></ul> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"><li>○ Ability to obtain information from the Internet and textbooks in order to deepen and broaden the acquired knowledge in the medicinal chemistry domain.</li></ul>
Contents	<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; IUPAC rules applied to 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. Pharmacokinetic parameters. Phase I and II metabolic reactions.</p> <p>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. Spatial form of the molecule and drug activity. The receptor theories. The concentration-response curves and the mechanism of action of drugs.</p> <p>Physiological neurotransmitters and their role in the peripheral and</p>



	central nervous systems. Structure, activity, and side effects of drugs on the following receptor systems and on 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 anesthetics), and on reuptake mechanisms (antidepressants). Proton pump inhibitors. Antihypertensives. Non-steroidal anti-inflammatory drugs. Antiallergic. General anesthetics.
<b>Course program</b>	
Bibliography	<ol style="list-style-type: none"><li>1. Williams, D. A. &amp; Lemke, T. L. Foye's Principi di Chimica Farmaceutica. Piccin, Padova, 2021 (7<sup>a</sup> ed.).</li><li>2. Gasco, A.; Gualtieri, F.; Melchiorre, C. Chimica Farmaceutica. CEA, Milano, 2020 (2<sup>a</sup> ed.).</li><li>3. Wermuth, C. -G. La Pratica della Chimica Farmaceutica. Edises, Napoli, 2000.</li><li>4. Patrick, G. L. Introduzione alla Chimica Farmaceutica. Edises, Napoli, 2015 (3<sup>a</sup> ed.).</li><li>5. William O. Foye, Thomas L. Lemke, S. William Zito, Victoria F. Roche, David A. Williams, A. Chilin (a cura di), G. Zagotto (a cura di). Principi di Chimica Farmaceutica – L'Essenziale. Piccin, Padova, 2017 (1<sup>a</sup> ed.).</li></ol>
Notes	<p>Exemplary Web sites:: <a href="https://it.wikipedia.org">https://it.wikipedia.org</a> <a href="https://pubchem.ncbi.nlm.nih.gov/">https://pubchem.ncbi.nlm.nih.gov/</a> <a href="https://go.drugbank.com/">https://go.drugbank.com/</a> <a href="https://www.ebi.ac.uk/chembl/">https://www.ebi.ac.uk/chembl/</a></p> <ul style="list-style-type: none"><li>• 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).</li></ul>
Teaching methods	
Assessment methods	
Evaluation criteria	<ul style="list-style-type: none"><li>• <i>Knowledge and understanding</i><ul style="list-style-type: none"><li>○ Adequate knowledge of the main drug classes</li></ul></li><li>• <i>Applying knowledge and understanding</i><ul style="list-style-type: none"><li>○ Solid ability to represent the structure of drugs starting from the rational name, evaluation of the chemical-physical profile on the basis of the recognized functional groups and of the biopharmaceutical and pharmacokinetic implications.</li></ul></li><li>• <i>Autonomy of judgment</i><ul style="list-style-type: none"><li>○ Ability to correctly represent the structure of drugs starting from the rational name for the purpose of recognizing the class they belong to, the corresponding SARs, the probable metabolites, any toxicological and social correlates.</li></ul></li><li>• <i>Communication skills</i><ul style="list-style-type: none"><li>○ Ability to describe the structure of drugs using correctly the chemical-pharmaceutical jargon</li><li>○ Ability to describe the pharmacokinetics and pharmacodynamics of drugs and to argue about them in a simple, clear, and rigorous way.</li></ul></li></ul>



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	<ul style="list-style-type: none"><li>• <i>Capacities to continue learning</i><ul style="list-style-type: none"><li>○ The ability to collaborate with the teacher in solving Medicinal Chemistry problems formulated extemporaneously or on the basis of news reports, ideas from the media and specialist literature is assessed.</li></ul></li></ul>
Further information	