



**Jordan University of Science and Technology**  
**Faculty of Pharmacy**  
**Doctor Of Pharmacy (Pharm D.) Department**

PHMD332 Chemistry Of Natural Products (For Pharm D Students)
Second Semester 2022-2023

Course Catalog
3 Credit Hours. Basic information about classes of natural products, secondary metabolites, and their distribution, plants and microorganisms as sources for natural drugs. Methods for discovering natural drugs and the importance of these drugs in pharmaceutical care are also included.

Text Book	
<b>Title</b>	Medicinal Natural Products: A Biosynthetic Approach
<b>Author(s)</b>	Paul M. Dewick
<b>Edition</b>	3rd Edition
<b>Short Name</b>	Ref #1
<b>Other Information</b>	2009, John Wiley & Sons

**Course References**

Short name	Book name	Author(s)	Edition	Other Information
Ref # 2	Fundamentals of Pharmacognosy and Phytotherapy.	Michael Heinrich, Joanne Barnes, Simon Gibbons, Elizabeth M. Williamson	3rd Edition	2018, Elsevier.

Instructor	
Name	Dr. Rana Qasaymeh
Office Location	P1 L-1
Office Hours	
Email	ranaqasaymeh@just.edu.jo

Class Schedule & Room
<p>Section 2: Lecture Time: Sun, Tue : 11:30 - 12:30 Room: P1102</p> <p>Section 10: Lecture Time: Sun, Tue : 14:30 - 15:30 Room: D4203</p> <p>Section 11: Lecture Time: Mon, Wed : 13:00 - 14:00 Room: NF45</p>

Tentative List of Topics Covered		
Weeks	Topic	References
Weeks 1, 2, 3	Introduction: Pharmacognosy vs. natural products chemistry The role of natural products in drug discovery and development.	
Week 3	Approaches to discover new drug leads from nature Methods in natural product chemistry	
Week 4	Primary and secondary metabolism; The building blocks; Enzymes and catalysis	<b>Chapter 2</b> From Ref #1
Week 5	The acetate pathway: fatty acids and polyketides, Saturated fatty acids, unsaturated fatty acids, uncommon fatty acids, prostaglandins, thromboxanes, leukotrienes	<b>Chapter 3</b> From Ref #1

Week 6	The acetate pathway: fatty acids and polyketides Macrolides and aromatics	Chapter 3 From Ref #1
Week 7	The shikimate pathway: Aromatic amino acids, simple benzoic acids, and phenylpropanoids	Chapter 4 From Ref #1
Week 8	The shikimate pathway: Aromatic polyketides and terpenoid quinones	Chapter 4 From Ref #1
Week 9	The mevalonate pathway: terpenoids and steroids Monoterpenes and sesquiterpenes	Chapter 5 From Ref #1
Week 10	The mevalonate pathway: terpenoids and steroids; Diterpenes, triterpenes and steroidal saponins	Chapter 5 From Ref #1
Week 11	The mevalonate pathway: terpenoids and steroids; Cardiac glycosides, phytosterols, and tetraterpenes	Chapter 5 From Ref #1
Week 12	Peptides, proteins, and other amino acid derivatives: Peptides and proteins, peptide hormones, and modified peptides: penicillins and cephalosporins	Chapter 7 From Ref #1
Week 13	Alkaloids: Ornithine and lysine derived, nicotinic acid derived, phenylalanine and tyrosine derived	Chapter 6 From Ref #1
Week 14	Alkaloids: Tryptophan derived, histidine derived, purine derived, and terpenoid derived	Chapter 6 From Ref #1

Mapping of Course Outcomes to Program Student Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Demonstrate the basics of natural products and various methods in natural products chemistry. [1PLO1.1]	25%	
Build good understanding of the biosynthetic pathways of compounds of natural origin, their occurrence, structures, and different structural classes of NPs. [1PLO1.1]	40%	
Develop a thorough understanding of pharmacological activities of NPs and their contribution to drug discovery [1PLO1.1]	20%	
Breakdown complex natural product structures into simpler fragments and building blocks [1PLO1.1]	15%	

Relationship to Program Student Outcomes (Out of 100%)																
PLO1.1	PLO2.1	PLO2.2	PLO2.3	PLO2.4	PLO3.1	PLO3.2	PLO3.3	PLO3.4	PLO3.5	PLO3.6	PLO4.1	PLO4.2	PLO4.3	PLO4.4	PLO5.1	PLO5.1
100																

Evaluation	
Assessment Tool	Weight
First Hour Exam	25%
Second Hour Exam	25%
Final Exam	40%
Active learning	10%

Policy	
Cheating	Prohibited; The commitment of the acts of cheating and deceit such as copying during examinations, altering examinations for re-grade, plagiarism of homework assignments, and in any way representing the work of others as your own is dishonest and will not be tolerated. Standard JUST policy will be applied المادة 7: إذا ضبط الطالب أثناء الامتحان أو الاختبار متلبساً بالغش فتوقع عليه العقوبات التالية مجتمعة: أ- اعتباره راسياً في ذلك الامتحان أو الاختبار. ب- إلغاء تسجيله في بقية المساقات المسجل لها في ذلك الفصل. ج- فصله من الجامعة لمدة فصل دراسي واحد، و هو الفصل التالي للفصل الذي ضبط فيه.
Attendance	Excellent attendance is expected. JUST policy requires the faculty member to assign ZERO grade (35) if a student misses 10% of the classes that are not excused. If you miss class, it is your responsibility to find out about any announcements or assignments you may have missed.
Classroom Cell Phone Policy	The use of cell phones, smart phones, or other mobile communication devices is disruptive, and is therefore prohibited during class without permission. Except in emergencies, those using such devices must leave the classroom for the remainder of the class period.
Active learning and students' participation	Different interactive classroom activities will be performed to assess learning. Students are expected to actively participate in class discussions

<p>Classroom Etiquette</p>	<p>Respect</p> <ul style="list-style-type: none"> <li>o Respect people, places, and things.</li> <li>o Raise your hand to speak.</li> <li>o Listen respectfully.</li> <li>o Food and drink are not permitted in class.</li> <li>o Do not engage in aside conversations.</li> </ul> <p>Participation or Disruption:</p> <ul style="list-style-type: none"> <li>o Do not hesitate to ask questions at any time, especially if you are unsure of something.</li> <li>o Listen to other students' questions to avoid asking the same question five minutes later.</li> <li>o Allow your classmates to participate in class discussions and refrain from taking advantage of all opportunities for active participation.</li> </ul> <p>Cell Phones and Electronic Devices:</p> <ul style="list-style-type: none"> <li>o Texting is not permitted in class.</li> <li>o The use of cell phones, smartphones, or other mobile communication devices is disruptive and is therefore prohibited during class without permission.</li> <li>o Your phone should be turned off. If you must keep your phone on, you should set it to vibrate or silent mode and leave class if you receive an emergency call.</li> <li>o Except in emergencies, those using such devices must leave the classroom for the remainder of the class period.</li> <li>o Do not use your laptop in class for browsing the Internet or using social media while in class.</li> </ul> <p>Missing a Class</p> <ul style="list-style-type: none"> <li>o Do not miss classes. It is not appropriate to ask the professor if you missed anything important if you miss class. Obviously, something of importance was missed, you missed a whole class!</li> <li>o Whenever you are absent from class, it is your responsibility to make up the work and to get notes, not your professor</li> <li>o If you need to leave early, notify the instructor.</li> </ul> <p>Be Punctual</p> <ul style="list-style-type: none"> <li>o Make sure you arrive to class on time.</li> </ul>
<p>Email Etiquette</p>	<ul style="list-style-type: none"> <li>- Type your email in the body of the email NOT in the subject line.</li> <li>- Provide a clear subject line. Keep it short and to the point, but not vague. Name, class, and what the email is specifically about should be in the subject line.</li> <li>- Body of the email: Your emails should always start with a formal greeting like you would in a letter, be brief (one screen length), check your spelling/grammar/punctuation, use a professional font (not decorative), and include a salutation aligned with your message (Thank you or Sincerely).</li> <li>? Avoid sending an email to your professor asking about grades or complaining about them. Schedule an appointment to meet in person to discuss areas for improvement if you have inquiries.</li> <li>- Consider the impression your tone will make in the email. It is recommended waiting 24 hours before sending an email or responding to an email if you are emotionally charged.</li> <li>- It is not appropriate to write in ALL CAPS. This conveys the impression that you are shouting at the recipient.</li> <li>- Make sure you read and reread your email before sending it. Make sure your emails are grammatically correct, have proper titles, and are properly spelled.</li> <li>- If you have multiple questions or the message runs long, you might consider revising the message or scheduling a face-to-face meeting.</li> <li>- You should double-check your ATTACHMENTS. Refer to your attachments within the body of your email. It is advisable to avoid attaching large files and to consider sending the document as a PDF.</li> <li>- Please allow sufficient time for a response. The sender and receiver should both allow sufficient time. As a rule of thumb, 24 work hours should be given. If sending emails after official work hours or during formal vacations, a delay in response is expected. Following that, if no response is received, you can follow up.</li> </ul>