وزارة التعليم العالي والبحث العلمي
جامعة المستقبل
كلية العلوم
قسم الكيمياء الحياتية

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Drug Stereochemistry**			**Module Delivery**	
Module Type	Basic			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	UOMU036364				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Biochemistry department		**College**	College of Science	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval Date			**Version Number**	1.0	

RelationwithOtherModules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	none	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Introduce students to the fundamental principles of stereochemistry and its application in drug design and action. • Explore the influence of chirality on pharmacodynamics and pharmacokinetics. • Analyze the stereochemical requirements of drugs interacting with chiral biological targets. • Examine the methods used for the synthesis, separation, and analysis of stereoisomers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Describe and differentiate types of stereoisomers including enantiomers and diastereomers. 2. Assign absolute configuration (R/S) to chiral centers in drug molecules. 3. Explain the significance of stereochemistry in drug action and metabolism. 4. Analyze the impact of chirality on drug efficacy and safety. 5. Interpret the methods used to measure and analyze stereoisomers in pharmaceutical compounds. 6. Discuss regulatory considerations for chiral drugs.
Indicative Contents المحتويات الإرشادية	1. **Introduction to Stereochemistry**, Chirality, isomerism, enantiomers, diastereomers 2. **Chirality in Organic Molecules**, Chiral centers, Fischer projections, R/S nomenclature 3. **Stereochemistry in Drug Molecules**, Importance of stereochemistry in drug-receptor interactions 4. **Enantiomeric Drugs and Their Activity**, Thalidomide case, ibuprofen, propranolol 5. **Pharmacokinetics and Stereoselectivity**, Absorption, distribution, metabolism, excretion 6. **Stereoselective Synthesis of Drugs**, Chiral auxiliaries, catalysts, asymmetric synthesis 7. **Racemic Mixtures and Resolution Methods**, Chromatography, enzymatic methods, crystallization 8. **Analytical Methods for Stereoisomer Identification**, Polarimetry, chiral HPLC, NMR, CD spectroscopy 9. **Regulatory Aspects and Guidelines**, FDA/EMA considerations for chiral drugs 10. **Case Studies of Marketed Chiral Drugs**, Esomeprazole, levocetirizine, artemisinin derivatives

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• . Interactive lectures with real-world molecular examples • Laboratory sessions using modern molecular tools • Group presentations on genetic engineering topics • Case studies in mutation and disease

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	

	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظر ي	
	Material Covered
Week 1	Introduction to drug stereochemistry and its importance
Week 2	Types of stereoisomers: enantiomers, diastereomers
Week 3	Chirality and chiral centers in drug molecules
Week 4	Cahn-Ingold-Prelog rules: Assigning absolute configuration (R/S system)
Week 5	Optical activity and polarimetry
Week 6	Stereochemistry in drug-receptor interactions
Week 7	Stereoselective metabolism of drugs
Week 8	Case studies of chiral drugs: Thalidomide, Ibuprofen
Week 9	Stereochemical principles in drug design and development
Week 10	Geometrical isomerism (E/Z) and its drug-related implications
Week 11	Regulatory perspectives on chiral drugs
Week 12	Racemates vs single enantiomer drugs
Week 13	Drug efficacy and toxicity related to stereochemistry
Week 14	Review and exam preparation
Week 15	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Eliel, E.L., Wilen, S.H. Stereochemistry of Organic Compounds. Wiley, 1994. 2. Patrick, G.L. An Introduction to Medicinal Chemistry, 6th Edition. Oxford University Press, 2017. 3. Kleemann, J., Engel, J. Pharmaceutical Substances: Syntheses, Patents, Applications. Thieme, 2021. 4. Fleming, I. Molecular Orbitals and Organic Chemical Reactions. Wiley, 2010. 5. FDA Guidance for Industry: Stereochemical Issues in Drug Development.	*Clinical Chemistry*
Recommended Texts		
Websites	https://pmc.ncbi.nlm.nih.gov/articles/PMC353039/	

APPENDIX:

GRADING SCHEME مخطط الدرجا ت				
Group	**Grade**	التقدي ر	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتيا ز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة يف وزارة التعليم العا يل والبحث العل ي م