Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2022-2023
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Xing Bengang
Course Author Email	bengang@ntu.edu.sg
Course Title	Pharmaceutical Chemistry
Course Code	CM4053
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	(CM1031 and CM1051 and CM2011 and CM2031 and CM3031) or (BS1003 and BS1005 and CM2011 and CM2031 and CM3031) or (BS1003 and CM1051 and CM2011 and CM2031 and CM3031) or (BS1005 and CM1031 and CM2011 and CM2031 and CM3031) or (CM1002 and CM2011 and CM2031 and CM3031) or by permission
Co-requisites	
Pre-requisite to	
Mutually exclusive to	CM4016
Replacement course to	
Remarks (if any)	

Course Aims

Pharmaceutical Chemistry is one interdisciplinary course to train the chemistry students in pharmacology and the biomedical sciences. In this course, the students will learn how the drug molecules will sustain their activities, their basic metabolism process, the essential pharmacokinetics and pharmacodynamics of drugs, biomedical analysis assay, biomedical microbiology and the antibiotic bacterial inactivation, basic concepts in clinical antitumor treatment. Moreover, brand new techniques in biomedical molecular imaging, and functional nanotechnology in nano-medicine will be also extensively covered in this class.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Identify the basic concept of drug-bio-receptors interactions and explain their activity mechanism.
ILO 2	Explain and apply the concept of pharmacokinetics, pharmacodynamics to drug molecule in pharmaceutical industry.
ILO 3	Describe the metabolism of drug processing during the treatment.
ILO 4	Interpret and predict the biological pathways during the diseases therapy (For example, in the area of Antitumor and bacterial inactivation).
ILO 5	Illustrate and describe the principles of pharmacogenetics.
ILO 6	Describe and judge applicability of new modalities for biomedical sensing and imaging in a range of pharmaceutical chemistry situation.
ILO 7	Explain the future perspective of functional nanomaterials towards biomedical applications: Drug Delivery, diseases therapy and diagnostics (theranostics).

Course Content

Introduction of pharmaceutical chemistry General Concept of Drug Metabolism Pharmacokinetics and Pharmacodynamics Principles of Pharmacogenetics I and II Anticancer therapeutics Antibiotics and Biomedical Microbiology Biomedical Fluorescent Imaging Nanomedicine

Reading and References (if applicable)

1. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry 12th ed. J. M. Beale Jr & J. H. Block ed. (on-line version onlv) By Lippincott Williams & Wilkins, 2010, ISBN-13: 978-0781779296
2. Foye's Principles of Medicinal Chemistry, Ed. by David Williams 2012. Edition 7th.) By Lippincott Williams & Wilkins, 2012 ISBN-13: 978-1609133450
3. Materials will also be chosen from the latest literatures.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Introduction to Pharmaceutical Chemistry	1,2	Pre/Post-lecture reading assignments		
2	Pharmacodynamic and Pharmacokinetics	1,2	Pre/Post-lecture reading assignments		
3	Pharmacodynamic and Pharmacokinetics	3			Quiz 1
4	General concept of Drug Metabolism	4	Pre/Post-lecture reading assignments		
5	General concept of Drug Metabolism	4			Quiz 2
6	Anticancer Therapeutics	5	Pre/Post-lecture reading assignments		
7	Anticancer Therapeutics	5			Quiz 3
8	Antibiotics and biomedical microbiology	5			MT1
9	Principles Pharmacogenetics I	6	Pre/Post-lecture reading assignments		
10	Principles Pharmacogenetics II	6			Quiz 4
11	Biomedical fluorescent imaging	7	Pre/Post-lecture reading assignments		

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
12	Biomedical fluorescent imaging	7			Quiz 5
13	Nanomedicine	7	Pre/Post-lecture reading assignments		

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Quiz questions after lecture	Students will be required to answer quiz questions assigned during formal lectures. This approach will allow students to exercise their critical thinking skills and help them actively learn the new concept and information.
Video animations	Using animation, video, or movie to illustrate certain concepts in class. This will function as an effective tool to simplify complicated theory for better understanding of the students.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Test/Quiz(Midterm Test)	1-3	Competence, written communication	20	Individual	Holistic	Multistructural
2	Continuous Assessment (CA): Test/Quiz(Quizzes)	1-7	Competence, written communication, creativity	20	Individual	Holistic	Multistructural
3	Summative Assessment (EXAM): Final exam(Final Examination)	1-7	Competence, written communication	60	Individual	Holistic	Multistructural

Description of Assessment Components (if applicable)

Formative Feedback

Describe how you would be giving feedback to students on how they are learning in this course.

- Quiz questions will be frequently given during lectures to monitor the progression of the students, if concepts, are misunderstood will be immediately clarified in the class.

- Mass tutorial will also be given in class to ensure students have sufficient practice and clarifying possible queries that they may have.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Care for Society	Basic
Creative Thinking	Intermediate
Curiosity	Intermediate
Critical Thinking	Intermediate

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

Students are expected to attend all lectures punctually and take all scheduled quizzes and tests by due dates. Students are expected to participate in all lectures discussions and activities.

Policy (Absenteeism)

Students who are absent without a valid reason during the midterm will definitely affect his overall grades. A make up test is possible if valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

Policy (Others, if applicable)

Diversity and Inclusion Policy

Integrating a diverse set of experiences is important for a more comprehensive understanding of science and engineering.

It is our goal to create an inclusive and collaborative learning environment that supports a diversity of perspectives and learning experiences. That honours your identities; including ethnicity, gender, socioeconomic status, sexual orientation, religion or ability.

To help accomplish this:

- If you are neuroatypical or neurodiverse, have dyslexia or ADHD (for example), or have a social anxiety disorder or social phobia;
- If you feel your performance in the course is being impacted by your experiences outside of class;
- If something was said in the course (by anyone, including instructor/supervisor) that made you uncomfortable.

Please e-mail to your Associate Chair (Students & Continuing Education) at ac-cceb-stud@ntu.edu.sg about how we can help facilitate your learning experience.

As a participant in course discussions you should also strive to honour the diversity of your classmates. You can do this by; using preferred pronouns and names; being respectful of others opinions and actively making sure all voices are being heard; and refraining from the use of derogatory or demeaning speech or actions.

All members of the course are expected to strictly adhere to the student code of conduct (https://www.ntu.edu.sg/life-at-ntu/student-life/student-conduct) . If you witness something that goes against this or have any other concerns, please speak to your instructors or a faculty member.

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