Basic information:	
Program on which the Block is offered	PharmD
Qualification Awarded	BPharmD
Block title - Code - Year	Drug Formulation – 3204– Foundational Year II
Block Type	Foundational
Total contact Hours / week [32 hrs.]	(Lectures: 6, Lab: 4, Tutorials: 3, Seminars: 2, PBL: 9, Self-study: 6, Exams: 2)
ECTS Hours	10
Pre-requisites for this Block	Fundamentals of Medicinal Chemistry, Fundamentals of Pharmacology, Physiology, Biopharmaceutics, Drug formulation-drug delivery, Drug Quality Assurance, Biotechnology, Pharmacy Practice, Biochemistry and English Language.
Week period	5

Block Description:

This block introduces students to different stages, procedures, tests, processes and regulations in pharmaceutical industry. This block also deals with drug design especially computer aided drug design and different applications of biotechnology. This block also covers pharmacokinetics & pharmacodynamics optimization, adverse drug reactions and drug-drug interactions, in addition to physiological and pharmacological aspects of adrenergic drugs and autacoids with emphasis on their structure activity relationship. Problem-based learning strategies are used for this block delivery.

Block Objectives:

By the end of this Block the student should be able to:

- Discuss the structure activity relationship of adrenergic and autacoid agonists and antagonists.
- Discuss the principles of drug design and how to optimize pharmacodynamics and pharmacokinetics.
- Perform drug design using computer aided tools.
- Review the physiological and pharmacological aspects of adrenergic system and autacoids.
- Describe the drug adverse effects and allergic drug reactions and their types.
- Identify the different types of drug interactions.
- Discuss the factors affecting the absorption of different dosage forms.
- Explain how to determine dosage regimen based on different aspects.
- Determine the application of complexations and polymers in pharmaceutical industry.
- Identify different stages and processes that are included in the pharmaceutical industry.
- Describe drug regulation models.
- Demonstrate the different procedures and requirements of quality control for sterile and non-sterile end products.

- Perform quality control tests for different dosage forms.
- Recognize the medical, environmental, industrial and agriculture application of biotechnology.
- Discuss the concept of evidence-based medicine.
- Discuss the concept of over the counter (OTC) drugs.
- Develop skills of observation and critical reading.
- Analyze, interpret, and evaluate data from various sources.

Learning and Teaching Methods, & Assessment Methods

Learning and Teaching Methods:

- Problem-Based Learning (PBL)
- Lectures
- Tutorials
- Practice in lab
- Independent study assignments
- Presentations
- Seminars

Assessment methods:

- **Continuous assessment:**
  - Problem Based Learning sessions (Brain-storming/Debriefing)
  - Reports
  - Report Discussion
  - Individual reassurance test (IRAT): MCQs
  - Group reassurance test (GRAT): MCQs
  - Presentations (oral)
  - Practice in lab
  - Open-book/open-web exam
- **End-Block exam:**
  - Written
- **Final-Block exam:**
  - Written
  - Objective structured practical examination (OSPE)

Weighting of Assessment:

Continuous assessment:	**60%**
• PBL sessions	• 30%
• Practical sessions	• 10%
• Other Activities (Tutorial/Seminar/Assignments/Moodle Activities)	• 10%
• End-block exam	• 10%
Final Exam:	**40%**

• Written	• 30%
• OSPE	• 10%
Total:	**100%**
Assessment Schedule:	
Continuous assessment:	**During the block**
• PBL sessions	Weeks 1-5
• Practical sessions	Weeks 1-5
• Other Activities (Tutorial/Seminar/Assignments/Moodle Activities)	Weeks 1-5
• End-block exam	At the end of the block
Final exam:	**At the end of the year**
• Written	At the end of the year
• OSPE	At the end of the block

Examination Regulations:

- If the student absenteeism is more than 25 % he/she cannot attempt the final exam.
- The total required percentage to pass this course is at least 60 %

List of textbooks and references:

- **<u>Course Notes:</u>**
  - PowerPoint presentations, videos and other materials related to lectures, tutorials and practical sessions are uploaded to the Moodle by experts on weekly basis according to teaching schedule.
- **<u>Essential Books (Text Books):</u>**
  - Amidon G. L.; Lennernas H.; Shah V. P.; Crison, J. R. (1995). A Theoretical Basis for a Biopharmaceutical Drug Classification: The Correlation of In Vitro Drug Product Dissolution and In Vivo Bioavailability. *Pharm. Res*.
  - Ansel H, Popovich N. (2011). *Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems*. 9th edition. Lippincott Williams & Wikins.
  - Crommelin ,D.J., Sindelar, R .D., and Meibohm, B. (2008), "Genomics, Other "Omics" Technologies, Personalized Medicine, and Additional Biotechnology-Related Techniques", in Sindelar, R.D. (ED), Pharmaceutical Biotechnology, 3 rd ed., Informa Healthcare USA.
  - Florence, A. T. and Attwood, D. (2008) Fast Track : Physical Pharmacy, Pharmaceutical Press London . Chicago.
  - Haynes RB. Introduction. In: Haynes RB, Taylor DW, Sackett DL, eds. Compliance in Health Care. Baltimore, MD: Johns Hopkins University Press.

- Hayes ,B.C and Hayes, J.D. (1989), "Blotting techniques for the study of DNA, RNA, and proteins", in Hayes, B. C, Wolf, C. and, Hayes, J. D. (ED), Departments of Medicineand Clinical Chemistry, Royal Infirmary, Edinburgh
- Jaworski, J. (2001), the application of biotechnology to industrial sustainability – a primer, organisation for economic co-operation and development, canada.
- M.E. Aulton, (2007). Text book of The science of dosage form design, 3rd editionChurchill-Livingstone, London.
- Medicines and Healthcare products Regulatory Agency (2007) Rules and Guidance for Pharmaceutical Manufacturers and Distributors , London : pharmaceutical press.
- Nair, A.J. (2008), Introduction to biotechnology and genetic engineering, Infinity science press LLC, Hingham, Massachusetts New Delhi, India
- Nelson, W.L., 2012. *Foye's Principles of Medicinal Chemistry: Seventh Edition*. Wolters Kluwer Health Adis (ESP)
- Patrick, G.L., 2013. *An introduction to medicinal chemistry*. Oxford university press.
- Rang, H, Ritter, J, Flower, R and Henderson, G. 2016, Rang and Dale's Pharmacology, 8th ed, Elsevier Churchill Livingstone, London
- Tripathi, K. 2013, Essentials of Medical Pharmacology, 7thed, Jaypee Brothers Medical Publishers (P) Ltd.
- Whalen, K, Finkel, R and Panavelil, T. 2017, Lippincott Illustrated Reviews: Pharmacology, 6thedn, Lippincott Williams &Wikins, Baltimore.
- Reddy, I.K. and Khan, M.A. (2003) *Essential math and calculations for pharmacy technicians*. CRC Press.
- Rees, J.A., Smith, I. and Watson, J. (2015) *Introduction to pharmaceutical calculations*. Pharmaceutical Press.

- **Periodicals and websites:**
  - Pharmacorama. 2005. Acetylcholine-metabolism available online: https://www.pharmacorama.com/en/Sections/Acetylcholine_2_1.php
  - Synthesis and Metabolism of Acetylcholine. 2015. Deranged physiology. Available online: http://www.derangedphysiology.com/main/core-topics-intensive-care/critical-care pharmacology /Chapter%203.2.1/ synthesis-and-metabolism-acetylcholine.
  - Pharmacorama. 2005. Metabolism of endogenous catecholamines. Available online: https://www.pharmacorama.com/en/Sections/Catecholamines_3.php
  - Mindsmapped. Differences between continuous and batch process. Available online: http://blogs.mindsmapped.com/industrial_automation/difference-between-continuous-and-batch-process/

Block Policies:

Code of conduct

Please refer to LIMU code of ethics http://limu.edu.ly/images/11/ethcode.pdf

Academic integrity

Please be aware that cheating, plagiarism, in-class disruption and dishonesty are vigorously prosecuted and that LIMU has a zero-tolerance policy.