DRUG DEVELOPMENT

Module designation	*Drug Development*
Semester(s) in which the module is taught	*1*
Person responsible for the module	1. Prof. Dr. Siswandono, MS., Apt. **(Course Coordinator)** 2. Prof. Dr. Bambang Tri Purwanto, MS., Apt. 3. Tri Widiandani
Language	*Bahasa Indonesia*
Relation to curriculum	~~*Compulsory / elective*~~ / specialisation
Teaching methods	*lecture, discussion, assignment*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *Contact hours (structured activities.): 90,67 hours* *Private study including independent learning activites*: *90,67 hours*
Credit points	*2 SCU / 6 ECTS*
Required and recommended prerequisites for joining the module	*NA*

Module objectives/intended learning outcomes	Students are: LO1: Able to realize excellence based on religious morals (excellence with morality), able to work together, and show a responsible attitude to work in their field of expertise independently. LO2: Able to internalize the spirit of independence, struggle, and entrepreneurship. LO3: Able to develop and build logical-critical-systematic-creative thinking and scientific conceptions through scientific research, design creation, or artworks of science and technology that pays attention to and applies humanities values through an interdisciplinary or multidisciplinary approach in the form of a thesis or other equivalent forms. LO4: Able to develop a pharmaceutical professional performance with analytical acumen in solving pharmaceutical problems and managing research in the pharmaceutical field related to national and global systems and policies, both inter and inter-disciplinary approaches. LO5: Able to access and review information through an Information and Communication Technology (ICT) system, decide on a specific subject of study, maintain the feasibility of implementing research designs, conduct research, analyze data, conclude research results comprehensively, and create strategic issues based on the study that reflect the latest updates in the field of pharmaceutical sciences, and communicate them in the media and scientific forums at the national and international level through an interdisciplinary or multidisciplinary approach in the form of a thesis or other equivalent forms. LO6: Able to make decisions in the context of solving problems related to science and technology development based on analytical or experimental studies through collaboration with colleagues, colleagues in institutions and research communities at both national and international levels and utilizing research results for the benefit of the user and other communities. LO7: Able to analyze natural materials to obtain active ingredients and/or pharmaceutical excipients with due observance of nature conservation. LO8: Able to carry out drug designs through the synthesis of bioactive compounds based on the structure-activity relationship. LO9: Able to carry out molecular manipulation of substances and develop formulations and manufacturing of pharmaceutical preparations with active pharmaceutical ingredients derived from natural products and synthetic compounds through the manufacture of polymorphs, nanoparticles, solid dispersions. LO11: Able to develop systems for evaluating the bioavailability of drugs in the body, pharmaceutical products circulation permits, and their in-vitro and in-vivo evaluations with specific delivery systems with appropriate analytical methods. LO13: Able to design drug development both from natural products and/or synthetic compounds by considering the biological mimicry system. LO14: Able to build drug management systems from active pharmaceutical ingredients to finished products that are ready for therapeutic uses.

Content	New Drug Development Course describes the scope and benefits of new drug development, activities in drug development, development of agonist and antagonist compounds, and rational drug development, steps in new drug development, structural modification in drug development, quantitative relationships structure with activity in drug development, optimization method of parent compound, and relationship of structure, metabolism with drug development.
Exams and assessment formats	*Take-home written assignments*
Study and examination requirements	*the final grade in the module is composed of 30% discussion, 30% presentation, 30% take-home assignments, 10% in-class participation and soft-skills assessment. Students must have a final grade of 70% or higher to pass*
Reading list	1. *Siswandono, ed., 2016. Kimia Medisinal I, Edisi Kedua. Sura- baya: Airlangga University Press.* 2. *Siswandono, 2014. Pengembangan Obat Baru. Surabaya:Airlangga University Press.* 3. *Stroomgaard, K., Krogsgaard-Larsen, P., Madsen, U., 2017.Textbook of Drug Design and Discovery, 5th ed., Boca Raton: CRC Press.* 4. *Lemke, T.L., Williams, D.A., Roche, V.F. and Zito, S.W. eds.,2013. Foye's Principles of Medicinal Chemistry. 7th ed., Baltimore: Lippincott Williams & Wilkins.* 5. *Klebe, G., 2013. Drug Design, Methodology, Concepts, andMode-of-Action, Heidelberg: Springer-Verlag.*