NATURAL PRODUCT ANALYSIS

Module designation	*Natural Product Analysis*
Semester(s) in which the module is taught	*2*
Person responsible for the module	1. Prof. Dr. Achmad Fuad Hafid, MS.,Apt.**(Course Coordinator)** 2. Dr Aty Widyawruyanti 3. Suciati, MPhil, Ph.D
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 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. 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. LO12: Able to develop analytical methods to ensure the quality of drugs, cosmetics, foods, and beverages.

Content	This course will learn about applied chemical analysis methods, such as: a. spectroscopic instruments (UV-Vis, NMR, MS) b. chromatographic instruments (TLC, CC, HPLC, GC) c. in particular (ICT): d. HPLC and TLC-Scanner (densitometry) methods and instruments e. NMR and LCMS methods and instruments for: 1. detection, analysis of the presence of compounds (analytes) in the matrix of materials and products 2. Identification, comparative analysis with standard compounds and/or standard data 3. Standardization, analysis of compound content profiles and determination of levels of analytical markers or levels of active components on natural ingredients as raw materials for medicinal plants) and their products (herbal drugs), specifically those relevant to thesis research on natural ingredients from plants (substances containing polyphenol flavonoids, alkaloids) terpenoids.
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. Joachim Ermer and John H. McB. Miller (Eds.) 2005; Method Validation in Pharmaceutical Analysis. A Guide to Best Practice. WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, ISBN: 3-52 7-31255-2, page – 226* *2. W. Jeffrey Hurst (Ed), 2008; Methods of analysis for functional foods and nutraceuticals, 2nd ed. CRC Press Taylor & Francis Group, ISBN 978-0-8493-7314-5, Boca Raton, London, New York.* *3. Erwin E.J.M. Temminghoff and Victor J.G. Houb (Eds), 2004; Plant Analysis Procedures, Second Edition, Kluwer Academic Publishers, Dordrecht / Boston / London* *4. Vladimir Havlicek and Jaroslav Sepiteng (Eds), 2014, Natural Products Analysis Instrumentation, Methods, and Applications, New Jersey: John Wiley & Sons, Inc*