MODULE HANDBOOK

BACHELOR IN PHARMACY
FACULTY OF PHARMACY
UNIVERSITAS GADJAH MADA
2022

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LIST OF COURSES

Module 1: Pharmaceutical Biochemistry

Pharmaceutical Biochemistry (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221103/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Dr. apt. Rumiyati, M.Si. (coordinator) 2. Dr. rer.nat apt. Adam Hermawan, M.Sc. 3. apt. Muhammad Novrizal Abdi Sahid, S.Farm., M.Eng.,PhD. 4. apt. Setyowati Triastuti Utami, S. Farm., M.Sc., Ph.D.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: learning by method of Case-based Project Will be carried out using the method: 1. Tutorial and Discussion, where students will listen to the lecturer's explanation and discuss issues related to the material provided 2. Case-based Project-based learning, where students will be given a case to be solved by team of student and the results will be presented in front of the lecturer and other students 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 credit = 3.2 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Students can understand comprehensively the topics regarding role of Biochemistry, the function of water in human life, basic concept of bioenergetic, structure and function of proteins, protein purification technique, basic concept of enzyme kinetic, membrane structure and dynamic in pharmaceutical fields. 2. Students can understand basic concept and metabolism of carbohydrate such as glycolysis, citric acid cycle, oxidative phosphorylation, gluconeogenesis, glycogen metabolism; fatty acid metabolism; amino acid degradation and urea cycle; biosynthesis membrane lipid, steroid; amino acid and hem metabolism, nucleotide and integration metabolism. Students are also expected to be able to explain mechanism of occurrence of some diseases related to the metabolism pathways.

Description	:	The topic covers : an important role of Pharmaceutical Biochemistry, the function of water in our life, bioenergetic, structure and function of proteins, protein purification technique, membrane structure and dynamic, basic concept of enzyme kinetic, basic concept and metabolism of carbohydrate, glycolysis, citric acid cycle, oxidative phosphorylation, gluconeogenesis, glycogen metabolism, fatty acid metabolism, amino acid degradation, and urea cycle, biosynthesis membrane lipid, steroid, amino acid and hem, nucleotide and integration metabolism
Examination Format/Assessment Methods	:	10% Participative, 40% Project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Berg, J.M., Tymoczko, J.L., & Stryer, L., 2012, Biochemistry, 7th Ed., W.H. Freeman and Company, New York. 2. Lehninger, A.L., 2008, Principle of Biochemistry, 5th Ed., Worth Publisher Inc., Maryland. 3. Litwac, G., 2008, Human Biochemistry and Disease, Elsevier, Amsterdam. 4. Lundbald, R.L. & MacDonald, F.M., 2010, Handbook of Biochemistry and Molecular Biology, 4th Ed., CRC Press, London. 5. Rosethal, M.D. &Glew, R.H., 2009, Medical Biochemistry, Human Metabolism in Health and Diseases, John Willey & Sons, New York. 6. Sismindari, Rumiyati, Jenie, R.I., and Meiyanto, E., 2016, Biokimia Farmasi, Gadjah Mada University Press additional 1. Journal and Review from other source such as NCBI, PubMed, Elsevier

Date of last amendment: 8 August 2022

Module 2: Cell Biology-Microbiology

Cell Biology-Microbiology (3 Credits/4.8 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221105/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Dr. Sylvia UT. Pratiwi, M. Si. 2. Prof. Dr. Apt. Puji Astuti, M. Sc. 3. Dr. apt. Indah Purwantini, M.Si. 4. Apt. Puguh Indrasetiawan, M.Sc., Ph.D (Koordinator)
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Student-Centered Learning system: collaborative learning, self-directed learning, and cooperative learning. 150 minutes per week for 14 weeks in one semester
Workload	:	150 minutes of in-class lectures 180 minutes of structured assignment activities 180 minutes of independent activities In total 510 minutes/week In 16 weeks = 8160 minutes = 136.005 hours 1 ECTS = 28 hours
Credits	:	3 Credits/4.8 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Students are able to analyze theoretical concepts regarding cell structure and function in relation to the mechanism of drug action. 2. Students are able to identify problems related to parasites and microbes and their treatment mechanisms. 3. Students are able to test the quality of pharmaceutical preparations through microbiological methods. 4. Students are able to analyze drugs used for infection therapy
Description	:	The Cell Biology-Microbiology course explores into the theoretical concepts and practical applications of cell biology and microbiology. It covers the structure and function of both prokaryotic and eukaryotic cells, cell growth and differentiation, and the mechanisms of cell division and the cell cycle. The course also addresses microbial ecology, growth, and pathogenicity, along with pharmaceutical microbiology techniques such as microscopy

		and bioassays for microbial testing. Students will develop skills in microbiological quality control of pharmaceutical preparations, including sterility tests and validation. Additionally, the course examines the mechanisms of action of antibiotics, antimicrobial resistance, and therapeutic uses of antimicrobials, with a focus on the relationship between cell structure and drug function. The course combines classroom lectures with practical sessions to enhance students' understanding and application of these concepts in real-world scenarios.
Examination Format/Assessment Methods	:	40% Project, 25% midterm exam, 35% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., Watson, J.D., 1994, Molecular Biology of The Cell, Third Ed., Garland Publishing Inc., New York, USA 2. Avers, C.J., 1982, Basic Cell Biology, 2nd Edition, Willard Grant Press, Boston 3. Becker, W.M., Kleinsmith, L.J., and Hardin, J., 2000, The World of The Cell, 4th Edition, The Benjamin/Cummings Publishing Co., San fransisco 4. Campbell, N.A., 1996, Biology, 4th Edition, The Benjamin/Cummings Publishing Co.,California, USA 5. Karp, G., 1999, Cell and Molecular Biology: Concepts and Experiments, 2nd Edititon, John Willey and Sons, New York 6. Knox, B., Ladiges, P., Evans, N., 1999, Biology, 4th Edition, WCB,/McGraw-Hill Publishers, Australia 7. Prescott, L.M., Harley, J.P., Klein, D.A., 1993, Microbiology, 2nd Edition, Wm.C. Brown Publishers, USA 8. Djide, M. Natsir dan Sartini. 2008. Analisis Mikrobiologi Farmasi. UNHAS : Makassar 9. Kemenkes RI, 2020, Farmakope Indonesia Edisi VI 10. http://cdc.gov 11. Sastry, S.S., Bhat, S., 2019, Essential of Medical Parasitology, Jaypee Borthers Medical Pub. Additional : 1. Anonim, 2002, The Biologi Project, The university of Arizona, USA, tersedia [online]http://www.biology.arizona.edu/cell_bio/tutorials.html, 24 Juni 2004 2. Anonim, 2004, The Difference Between Prokaryotic and Eukaryotic Cells, tersedia [online], http://www.trentu.ca/academic/biology/101/2.html#prokaryotic, 26 Juni 2004

3. Farabee,M.J., 2001, Photosynthesis, tersedia [online] http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookPS.html, 24 Juni 2004
4. Gwen V. Childs, Ph.D., 1998, Lysosome, tersedia [online] http://cellbio.utmb.edu/cellbio/lysosome.htm, 26 Juni 2004
5. Thorpe, N.O., 1984, Cell Biology, John Willey and Sons, New York
6. Vanderschaegen, P., 1995. Golgi Apparatus, available [online], http://www.winterwren.com/apbio/cellorganelles/golgi.html, 26 Juni 2004
7. Weaver R.F and Hendrick, P.W., 1992, Genetics, 2nd Edititon, W.m.C., Brown Publishers, USA
8. Wolfe, S.L., 1993, Molecular and Cellular Biology, Wadsworth Publishing Company, Bekmont, California

Date of last amendment: 8 August 2022

Module 3: Pharmaceutics 1

Pharmaceutics 1 (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221107/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Dr. Chairun Wiedyaningsih, M.Kes., M. App.Sc., Apt. 2. Niken Nur Widyakusuma, M.Sc., Apt. 3. Prof. Dr. Susi Ari Kristina, M.Kes., Apt. 4. Fathul Muin, M.Pharm., Apt
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Case based learning 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Students get to know the history of pharmaceutical science, pharmacists, drugs and their classification, and the Indonesian Pharmacopoeia 2. Students are familiar with various forms of pharmaceutical dosage forms and how to use them 3. Students are able to understand recipes and copies of recipes
Description	:	Pharmaceutics 1 contains the main topics of the history of pharmacy and pharmacists, drugs and drug classification, introduction to the Indonesian Pharmacopoeia, introduction to dosage forms and how to use them: pulvis, pulveres, capsules, tablets, pills, pastes, creams, gels, suppositories, ointments, enemas, solutions, suspensions, emulsions, tinctures, extracts,

		infusions, eye drops, injections, vaccines, immunoserums, special preparations, medical devices, and disposable medical materials, and introduction to prescriptions and prescription copies and the use of Latin in prescriptions and prescription copies.
Examination Format/Assessment Methods	:	20% Assignment, 40% midterm exam, 40% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Anonim, 1995, Farmakope Indonesia, Edisi IV, Departemen Kesehatan RI, Jakarta. 2. Ansel, H. C., Popovich, N.G., Allen, L.V., 2005, Pharmaceutical Dosage Forms and Drug Delivery Systems, 8 th Ed., Williams & Wilkins, Philadelphia. 3. Haness,J.R., 1962, Latin Grammar Simplified, Coles Publishing Company, Limited, Toronto. 4. Langley,C., Belcher, D., 2008, Pharmaceutical Compounding and Dispensing, Pharmaceutical Press, London. 5. Allen, L.V, 2013, Remington: The Science and Practice of Pharmacy, 22 th Ed., Pharmaceutical Press and University of Sciences, Philadelphia. 6. Aulton, M.E., and Taylor K.M.G., 2013, Aulton's Pharmaceutics: The design and manufacture of medicines, 4th Ed, Elsevier, Edinburgh.

Date of last amendment: 8 August 2022

Module 4: Physical Pharmacy I

Physical Pharmacy I (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221108/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Dr. Abdul Karim Zulkarnain, M.Si., Apt. (coordinator) 2. Prof. Dr. Akhmad Kharis Nugroho, M.Si., Apt. 3. Dr. Adhyatmika, M.Biotech., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Students are able to understand phase rules and the causes of phase changes, the relationship between thermodynamics and pharmacy. 2. Students are able to explain the physical properties of drug molecules. 3. Students are able to explain the concepts of solutions, buffers, tonicity and predict the solubility of drug compounds. 4. Students are able to understand the basic principles of determining the stability/expiry time of drugs. 5. Students are able to apply the principles of dissolution in the formulation of medicinal preparations, both as a basis for preparation, design and quality control.
Description	:	This course discusses the subject of phase problems and phase rules, the relationship between thermodynamics and pharmaceuticals, physical properties of drug molecules, reaction kinetics, solution and solubility concepts, ionic comparisons (review), composition of buffers and buffer solutions, tonicity at isotonic pH.

Examination Format/Assessment Methods	:	20% Assignment, 5% discussion, 5% SCL, 10% quiz, 30% midterm exam, 30% final exam.
Learning Media	:	
Literature	:	1. Allen, T., 2003, Powder Sampling and Particle Size Determination, Elsevier, Amsterdam. 2. Aulton, M.E. (Ed.), 2004, Pharmaceutics: The Science of Dosage Form Design, 2nd Ed., ELBS, Hongkong. 3. Banher, G.S., Rhodes, C.T., 2002, Modern Pharmaceutics, 4th Ed., Marcel Dekker, New York. 4. Florence, A.T. & Attwood D., 2006, Physiochemical Principles of Pharmacy, 4th Ed., Pharmaceutical Press, London. 5. Kim, C.J., 2004, Advanced Pharmaceutics, Physicochemical Principles, CRS Press, New York. 6. Sinko, P.J., 2011, Martin's Physical Pharmacy and Pharmaceutical Sciences, 6th Ed., Lippincott Williams & Wilkins, A Wolters Kluwer Co., Philadelphia. Additional Reference: Physical Pharmacy lecture hand out

Date of last amendment: 8 August 2022

Module 5: Basic Pharmaceutical Chemistry

Basic Pharmaceutical Chemistry (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221109/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Prof. Dr. Ritmaleni, S.Si. (Coordinator) 2. Dr. Apt. Tatang Irianti, M.Sc. 3. Dr. Apt. Navista Sri Octa Ujiantari, S.Farm., M.Sc. 4. Apt. Halida Rahmania, S. Farm., M.Agr.Sc., Ph. D.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Tutorial and discussion 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Apply the stoichiometry concept of acid-base, redox and functional group and liquid-liquid extraction in analytical chemistry 2. apply the basic qualitative and quantitative analytical chemistry concepts by applying to the simple instruments 3. apply the basic concept of thermodynamics 4. apply the basic concept of organic chemistry and its application in pharmaceutical sciences
Description	:	Basic Pharmaceutical Chemistry Course will be the basic of other courses that involved in Pharmaceutical Sciences. This course consists of organic molecule formation, chemical bonding, kinetics, thermochemistry, anion, cation and functional group qualitative analysis, acid-base, gravimetry, thermal analytical method and basic electrochemistry.

Examination Format/Assessment Methods	:	20% Assignment, 40% midterm exam, 40% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Fesenden & Fessenden, Organic Chemistry 2. Brady, J.E. and Serese F., 2003, Chemistry, Matter and Its Changes, Fourth Edition, John Wiley and Sons Inc., New York 3. Cairns, D., 2008, Essentials of Pharmaceutical Chemistry, Pharmaceutical Press, London 4. Chang, R. and Overby, J., 2011, General Chemistry, The Essential Concepts, Sixth Edition, McGraw-Hill, New York 5. Christian, G.D., 2004, Analytical Chemistry, Sixth Edition, Brooks/Cole, USA 6. Craig, D.Q.M. and Reading, 2007, Thermal Analysis of Pharmaceuticals, CRC Press, London 7. Hill, J.W., Petrucci, R.H., McCreary, T.W., Perry, S.S., 2005, General Chemistry, Fourth Edition, Pearson Prentice Hall, Upper Saddle River, New Jersey 8. Masterton, W.L. and Hurley, C.N., 2009, Chemistry: Principle and Reaction, Sixth Edition, Brooks/Cole Cengage Learning, California

Date of last amendment: 8 August 2022

Module 6: Organic Chemistry I

Organic Chemistry I (3 Credits/4.8 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221111/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Prof. Dr. Ritmaleni, S.Si. (Coordinator) 2. Dr. Hilda Ismail, M.Si., Apt. 3. Dr. Artania Adnin Tri Suma, S.Si. 4. Dr. Sci. apt. Rohmad Yudi Utomo, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Tutorial and discussion 100 minutes per week for 14 weeks in one semester
Workload	:	150 minutes of in-class lectures 180 minutes of structured assignment activities 180 minutes of independent activities In total 510 minutes/week In 16 weeks = 8160 minutes = 136.005 hours 1 ECTS = 28 hours
Credits	:	3 Credits/4.8 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. understand the basic concept of structure, chemical bonding functional group, alkane, and cycloalkane 2. understand the basic concept of stereochemistry, alkene, alkyne, and alkyl halide 3. understand the basic concept of aromaticity, electrophilic and nucleophilic substitution reactions on aromatic compound 4. understand the basic concept of alcohol, ether, epoxide, phenol, amine, and retrosynthetic analysis on alcohol
Description	:	Organic Chemistry I Course will be the base of other courses that need the understanding of structure and its function in relation with Pharmaceutical Sciences. This course consists of structure, chemical bonding functional group, alkane, cycloalkane, stereochemistry, alkene, alkyne, alkyl halide, aromaticity, electrophilic and nucleophilic substitution reactions on

		aromatic compound, ether, epoxide, phenol, thiol, sulphide, amine, and retrosynthetic analysis on alcohol
Examination Format/Assessment Methods	:	20% Assignment, 40% midterm exam, 40% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Mc.Murry, J. 2012, Organic Chemistry 2. Clayden et al., 2012, Organic Chemistry

Date of last amendment: 8 August 2022

Module 7: Pharmaceutical Biochemistry Practical Work

Pharmaceutical Biochemistry Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221104/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Dr. apt. Rumiyati, M. Si. (coordinator) 2. apt. Setyowati Triastuti Utami, M. Sc., Ph.D 3. Prof. Dr. apt. Edy Meiyanto, M. Si. 4. Dr. apt. Riris Istighfari Jenie, M.S i. 5. Dr.rer.nat. apt. Adam Hermawan, M.Sc. 6. Dr. apt. Muthi' Ikawati, M. Sc. 7. apt. Muhammad Novrizal Abdi Sahid, M. Eng., PhD 8. Dr. Cyntia Nurul Apsari, M. Si. 9. Dr. Raisatun Nisa
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Team-based Project 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	None

Course Learning Outcomes (CLO)	:	1. Students are able to understand the basic principles and use various equipment necessary for practical work (group work/practical sessions) 2. Students are able to measure enzyme activity and kinetic parameters such as Km and Vmax (group work/practical sessions) 3. Students are able to perform protein analysis, including protein separation and molecular weight determination using the SDS PAGE method (group work/practical sessions) 4. Students are able to measure the products of macromolecule metabolism, such as carbohydrates, and determine glycogen levels (group work/practical sessions) 5. Students are able to perform protein structure analysis (group work/practical sessions)
Description	:	This practical course covers the basic principles of the equipment used in the laboratory, analysis of enzyme activity and kinetic parameters such as Km and Vmax, protein separation and determination of protein molecular weight using the SDS PAGE method, measurement of glycogen levels resulting from carbohydrate metabolism, and protein structure analysis.
Examination Format/Assessment Methods	:	25% Participatory activity, 40% Project, 35% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Lehninger, A.L., 2003, Principles of Biochemistry, Worth publishers Inc., New York. 2. Elliot, W.H. and Elliot, D.C., 1996, Biochemistry and Molecular Biology, John wiley & Sons, New York. 3. Stryer, L., 2002, Biochemistry, 5 th ed., Freeman and Company, San Francisco. 4. Clark, J.M. and Robert, L.S., 1977, Experimental Biochemistry, 2 nd ed., Feeman and Company, San Francisco. 5. Plummer, DT., 1971, An Introduction to Practical Biochemistry, Tata Mc Graw-Hill Publishing Company Ltd 6. Sambrook, J., Fritsch, E.F., Maniatis, T., 1989, Molecular Cloning: A Laboratory Manual, 2nd ed. , Cold Spring Harbor Laboratory Press USA. 7. Scope, R. K., 1987, Protein Purification, Principles and Practice, 2nd ed., Springer Verlag, New York

Date of last amendment: 8 August 2022

Module 8: Cell Biology-Microbiology Practical Work

Cell Biology-Microbiology Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221106/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Dr. Apt. Indah Purwantini, M. Si. (Koordinator) 2. Prof. Dr. Apt. Puji Astuti, M. Sc. 3. Dr. Djoko Santosa, M. Si. 4. Dr. Sylvia T Pratiwi, M. Si. 5. Dr. Apt. Purwanto, M.Si 6. Apt. Puguh Indrasetiawan, M.Sc., PhD 7. Apt. Setyowati Triastuti Utami, M.Sc., PhD
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning is carried out using the SCL system, students carry out independent practice 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Students are able to analyze theoretical concepts about cell structure and function in relation to the mechanism of action of drugs 2. Students are able to test the quality of pharmaceutical preparations microbiologically 3. Students are able to analyze drugs used for infection therapy
Description	:	Cell Biology Practicum - Microbiology is given in the form of learning through practicum (1 credit). Overall, Cell Biology - Microbiology discusses the scope and benefits of studying pharmaceutical microbiology and cell biology and parasitology in the field of pharmacy in particular and health in general, which includes the basic concepts of cell biology for prokaryotic and eukaryotic organisms, the process of cell division and its application in the discovery of antimicrobial drugs and the occurrence of disease. , common tests and assays required in pharmaceutical microbiology.
Examination Format/Assessment Methods	:	30% Pretest, 40% Project report, 30% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)

Literature	:	1. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., Watson, J.D., 1994, Molecular Biology of The Cell, Third Ed., Garland Publishing Inc., New York, USA 2. Avers, C.J., 1982, Basic Cell Biology, 2nd Edition, Willard Grant Press, Boston 3. Becker, W.M., Kleinsmith, L.J., and Hardin, J., 2000, The World of The Cell, 4th Edition, The Benjamin/Cummings Publishing Co., San fransisco 4. 4. Campbell, N.A., 1996, Biology, 4 th Edition, The Benjamin/Cummings Publishing Co.,California, USA 5. Prescott, L.M., Harley, J.P., Klein, D.A., 1993, Microbiology, 2nd Edition, Wm.C. Brown Publishers, USA 6. Djide. M.Natsir. Sartini. (2006), ”Analisis Mikrobiologi Farmasi”, Jurusan Farmasi Universitas Hasanuddin, Makassar 7. Djide, M. Natsir dan Sartini. 2008. Analisis Mikrobiologi Farmasi. UNHAS : Makassar 8. Kemenkes RI, 2020, Farmakope Indonesia Edisi VI

Date of last amendment: 8 August 2022

Module 9: Basic Pharmaceutical Chemistry Practical Work

Basic Pharmaceutical Chemistry Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221110/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. apt. Navista Sri Octa Ujiantari, S.Farm., M.Sc., Ph.D. (coordinator) 2. Prof. Dr. Ritmaleni, S.Si. 3. Dr.rer.nat. apt. Tatang Irianti, M.Sc. 4. apt. Eka Noviana, S.Farm., M.Sc., Ph.D. 5. apt. Halida Rahmania, S.Farm., M.Agr.Sc., Ph.D.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial: Students will listen to the instructor's explanations during each session (approximately 30 minutes). 2. Case-Based Learning: Students will be assigned tasks to solve problems according to the objectives of each practical topic. 3. Discussion: Students will pose questions or answer questions related to issues according to the objectives of each practical topic. 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory work
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Students will be able to apply safety practices in the laboratory and use laboratory equipment. 2. Students will be able to apply the concepts of acid-base titration. 3. Students will be able to apply the concepts of chemical kinetics. 4. Students will be able to apply the concepts of extraction. 5. Students will be able to apply the concepts of qualitative analysis of cation. 6. Students will be able to apply the concepts of qualitative analysis of anion.
Description	:	The course "Basic Pharmaceutical Chemistry Laboratory" is offered as a practical learning experience (1 credit) covering fundamental practices in Pharmaceutical Chemistry. This course serves as a support for subjects related to the application of chemistry in the pharmaceutical field. It includes safety practices in the laboratory, introduction and the use of laboratory equipments, acid-base titration, chemical kinetics, extraction, qualitative cation analysis, and qualitative anion analysis.

Examination Format/Assessment Methods	:	10% Participatory Activities, 60% Project, 30% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Bassett. Al., Pudjaatmaka A.H. Setiono L., (1994), Buku Ajar Vogel Kimia Analisis Kuantitatif Anorganik, Edisi 4, Jakarta; Penerbit Buku Kedokteran EGC. 2. Day, R A, dan Underwood, A L., (2002), Analisis Kimia Kuantitatif Edisi Keenam,Erlangga, Jakarta. 3. Khopkar, S.M., 2003, Konsep Dasar Kimia Analitik, Universitas Indonesia Press, Jakarta. 4. Chang, Raymond. (2008). General Chemistry: The Essential Concepts (ed. 5). New York: McGraw-Hill Companies, Inc.. 5. Gandjar, I. G. & Rohman, A. (2007). Kimia farmasi analisis. Yogyakarta: Pustaka Pelajar. 6. Rohman, A. (2022). Kimia Farmasi Analisis untuk Mahasiswa. Yogyakarta: Pustaka Pelajar. 7. Tim Kimia Farmasi Dasar. (2022). Petunjuk Praktikum Kimia Farmasi Dasar. Program Studi Sarjana Farmasi. Universitas Gadjah Mada. Additional : 1. Integration of community service into courses:, Link: https://farmasi.ugm.ac.id/tingkatkan-keamanan-dan-keselamatan-laboratorium-farmasi-ugm-adakan-sosialisasi-bagi-guru-kimia-sma-se-kota-yogyakarta/ Note : Including reference sources from forms of integration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 88: Human Physiology Anatomy

Human Physiology Anatomy (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221101/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	1. Dr. dr. Dicky Moch. Rizal, M.Kes., Sp.And. 2. dr. Ginus Partadiredja, M.Sc., Ph.D.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Able to understand organ anatomy and physiology of the central and peripheral nervous system, urinary (kidneys and body fluids), senses, cardiovascular, as well as metabolism and thermoregulation 2. Able to understand organ anatomy and physiology of the endocrine and reproductive systems, gastrointestinal, blood and immunity, respiration, exercise physiology, and musculoskeletal
Description	:	This course provides students with lecture material on the topics of anatomy and physiology of various organ systems which are important for health students to study, especially pharmacy. The material studied consists of organ anatomy and physiology of the central and peripheral nervous systems, urinary (kidneys and body fluids), senses, cardiovascular, as well as metabolism and thermoregulation, endocrine and reproduction, gastrointestinal, blood and immunity, respiration, exercise physiology, and musculoskeletal.

Examination Format/Assessment Methods	:	35% midterm exam, 35% final exam, 10% project report, 20% practical work final exam.
Learning Media	:	
Literature	:	1. Arthur, C. &Guyton, M.D., 2007, Textbook of Medical Physiology, 11th Ed., WB Saunders Co., Philadelphia, London, Toronto. 2. Ganong, W.F., 1995, Review of Medical Physiology, 17th Ed., Lange Medical Book, Prentice Hall International Inc. 3. Kelly, L., 2005, Essential of Human Physiology for Pharmacy, CRC Press. London. 4. Scanlon, V.C. &Sanders, T., 2007, Essentials of Anatomy and Physiology, 5th Ed., F.A. Davis Company, Philadephia.

Date of last amendment: 8 August 2022Module 89: Human Physiology anatomy Practical Work

Human physiology anatomy Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221102/Compulsory
Level	:	Undergraduate
Semester	:	1
Course Coordinator/Lecturer	:	
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	None
Course Learning Outcomes (CLO)	:	1. Able to understand organ anatomy and physiology of the central and peripheral nervous system, urinary (kidneys and body fluids), senses, cardiovascular, as well as metabolism and thermoregulation 2. Able to understand organ anatomy and physiology of the endocrine and reproductive systems, gastrointestinal, blood and immunity, respiration, exercise physiology, and musculoskeletal
Description	:	This course provides students with lecture material on the topics of anatomy and physiology of various organ systems which are important for health students to study, especially pharmacy. The material studied consists of organ anatomy and physiology of the central and peripheral nervous systems, urinary (kidneys and body fluids), senses, cardiovascular, as well as metabolism and thermoregulation, endocrine and reproduction, gastrointestinal, blood and immunity, respiration, exercise physiology, and musculoskeletal.
Examination Format/Assessment Methods	:	35% midterm exam, 35% final exam, 10% project report, 20% practical work final exam.
Learning Media	:	
Literature	:	1. Arthur, C. &Guyton, M.D., 2007, Textbook of Medical Physiology, 11th Ed., WB Saunders Co., Philadelphia, London, Toronto. 2. Ganong, W.F., 1995, Review of Medical Physiology, 17th Ed., Lange Medical Book, Prentice Hall International Inc. 3. Kelly, L., 2005, Essential of Human Physiology for Pharmacy, CRC Press. London. 4. Scanlon, V.C. &Sanders, T., 2007, Essentials of Anatomy and Physiology, 5th Ed., F.A. Davis Company, Philadephia.

Date of last amendment: 8 August 2022

Module 10: Molecular Biology

Molecular Biology (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221201/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	Dr. Riris Istighfari Jenie, M.Si., Apt (Coordinator) Dr. Rumiyati, M.Si., Apt. Dr. Muthi' Ikawati, M.Sc., Apt. Dr. Puguh Indrasetiawan, M.Sc., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Team-based Project. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmaceutical Biochemistry FAF 221103 Cell Biology-Microbiology FAF 221105
Course Learning Outcomes (CLO)	:	1. Students can explain the nature of genetic material (DNA, RNA), estimate mutations, and repair mutations in biological systems. 2. Students can understand the application of characteristics of genetic material (DNA, RNA) in explaining genetic diversity (polymorphism), DNA analysis, and the mechanisms of viral infection and genetic transformation. 3. Students can compare the regulation of gene expression (transcription and translation) in prokaryot and eukaryot biological systems.

		4. Students can use the molecular biology knowledge gained to explain the pathophysiology of cancer disease (carcinogenesis) at the molecular level.
Description	:	The Molecular Biology course consists of 2 credits of lectures. The Molecular Biology Lecture contains subjects regarding prokaryotes and eukaryotic cells, organelles and energy generation functions in cells, cytoskeletons, structures, and properties of nucleic acids. It is also explained molecularly: the central dogma of expression of a gene, the structure of genes and genomes, polymorphism, explained about the process by which mutations occur and their repair, how a gene is replicated, expressed into RNA, and then into proteins; how is the regulation of gene expression in both prokaryotes and eukaryotes; how intercellular communication (signal transduction) runs and the types of transduction signals, about the process of cell division and its regulation, and a little about carcinogenesis.
Examination Format/Assessment Methods	:	15% Participatory Activities, 35% Project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Alberts, B., et al., 2015, Molecular Biology of the Cell, 6th Edition, Garland Publishing, USA 2. Becker, W.M., Kleinsmith, L.J., and Hardin, J., 2000, The World of The Cell, 4th Edition, The Benjamin/Cummings Publishing Co., San Francisco Addition: 1. Sommer AK, Hermawan A, Mickler FM, Ljepoja B, Knyazev P, Bräuchle C, Ullrich A, Wagner E, Roidl A. Salinomycin co-treatment enhances tamoxifen cytotoxicity in luminal A breast tumor cells by facilitating lysosomal degradation of receptor tyrosine kinases. Oncotarget. 2016 Aug 2;7(31):50461-50476. doi: 10.18632/oncotarget.10459. PMID: 27409163; PMCID: PMC5226596. 2. Jenie RI, Handayani S, Susidarti RA, Udin LZ, Meiyanto E. The Cytotoxic and Antimigratory Activity of Brazilin-Doxorubicin on MCF-7/HER2 Cells. Adv Pharm Bull. 2018 Aug;8(3):507-516. doi: 10.15171/apb.2018.059. Epub 2018 Aug 29. PMID: 30276148; PMCID: PMC6156471. 3. Meiyanto E, Husnaa U, Kastian RF, Putri H, Larasati YA, Khumaira A, Putri DDP, Jenie RI, Kawaichi M, Lestari B, Yokoyama T, & Kato J, 2021, The Target Differences of Anti-Tumorigenesis Potential of Curcumin and Its Analogues Against HER-2 Positive and Triple-Negative Breast Cancer Cells, Advanced Pharmaceutical Bulletin, 11(1), 188-196. https://doi.org/10.34172/apb.2021.020

4. Meiyanto E, Septisetyani EP, Larasati YA, & Kawaichi M, 2018, Curcumin Analog Pentagamavunon-1 (PGV-1) Sensitizes Widr Cells to 5-Flurouracil through Inhibition of NF-kB Activation, Asian Pacific Journal of Cancer Prevention, 19(1), 49-56. https://doi.org/10.22034/APJCP.2018.19.1.49
5. Fadliyah H, Putri NB, Walidah Z, Nurhayati IP, Ikawati M, & Meiyanto E, 2018, Anti-metastatic Profiles of Boesenbergia pandurata towards MCF-7/HER2 Cells, Indonesian Journal of Cancer Chemoprevention, 9(2), 68-77. http://dx.doi.org/10.14499/indonesianjcanchemoprev9iss2pp68-7
6. Wulandari F, Ikawati M, Kirihata M, Kato J, & Meiyanto E, 2021, A new curcumin analog, CCA-1.1, induces cell death and cell cycle arrest in WiDr colon cancer cells via ROS generation, Journal of Applied Pharmaceutical Science, 11(10), 099-105. http://doi.org/10.7324/JAPS.2021.1101014
7. Jenie RI, Amalina ND, Ilmawati GPN, Utomo RY, Ikawati M, Khumaira A, Kato J, & Meiyanto E, 2019, Cell Cycle Modulation of CHO-K1 Cells Under Genistein Treatment Correlates with Cells Senescence, Apoptosis and ROS Level but in a Dose-Dependent Manner, Advanced Pharmaceutical Bulletin, 9(3), 453-461. https://doi.org/10.15171%2Fapb.2019.054
8. Septisetyani EP, Ikawati M, Widaryanti B, & Meiyanto E, 2008, Apoptosis mediated cytotoxicity of curcumin analogues PGV-0 and PGV-1 in WiDr cell line, Proceedings The International symposium on Molecular targeted Therapy, ISBN: 978-979-95107-6-1, Faculty of Pharmacy UGM, pp. 48-56.
9. Meiyanto E & Ikawati M, 2019, Getting to Know Cancer and Its Therapy,https://kanalpengetahuan.farmasi.ugm.ac.id/2019/01/21/mengenal-kanker-dan-terapinya/
10. Purwanto, 2023, Research Proposal "Molecular Docking and Site-directed Mutagenesis of Penicillin G Asilase Encoding Gene from Escherichia coli and Its Effect on Enzyme Hydrolysis Activity".

Note : Includes reference sources from the form of integration of Research and / or PkM into courses

Date of last amendment: 8 August 2022

Module 11: Pharmacology I

Pharmacology I (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221203/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Prof. apt. Agung Endro Nugroho, M.Si., PhD. 2. apt. Nunung Yuniarti, M.Si., PhD. 3. apt. Dyaningtyas Dewi Pamungkas Putri, M.Sc., PhD 4. apt. Arief Nurrochmad, M.Si., M.Sc., PhD
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmaceutical Biochemistry (FAF 221103) Human Physiology anatomy (FAF 221101)
Course Learning Outcomes (CLO)	:	1. Students can explain the development and principles of testing in experimental pharmacology, including in vitro, ex vivo, and in vivo; theoretical concept of drug activity in the body and its molecular mechanisms; Pharmacokinetic principles include drug absorption and its mechanisms, distribution, metabolism and molecular mechanisms and drug excretion 2. Students can explain the basic principles of metabolism, types of metabolic reactions in excretory organs, influencing factors, genetic factors: pharmacogenetics; Excretion 3. Students are able to explain the actions and effects of drugs; Drug interactions with receptors; Relationship between dose and response; factors that influence patient response using pharmacokinetic and pharmacodynamic principles

		4. Students are able to explain the mechanism of action of drugs on the autonomic nervous system 5. Students are able to explain the mechanism of action of drugs on the central nervous system 6. Students are able to explain the mechanism of drug action on the cardiovascular system
Description	:	Pharmacology 1 studies the fate of drugs and drug activity in the body along with their molecular mechanisms (pharmacokinetics and pharmacodynamics). This course is preceded by an understanding of the definition of pharmacology, its history and development, the scope studied and the role of pharmacology in drug discovery and development. Apart from that, it also discusses experimental pharmacology, in silico, in situ, in vitro, ex vivo and in vivo, qualitative pharmacokinetics including drug absorption and its mechanisms, distribution, metabolism and drug excretion. Pharmacology 1 also studies the targets of drug action as well as the principles of drug action and their molecular mechanisms on specific action targets (enzymes, receptors, transporters, ion channels), discussing drug and receptor interactions with a kinetic focus and dose-effect relationships. At the organ level, Pharmacology 1 studies drugs that work on the autonomic nervous system, central nervous system, and cardiovascular drugs along with their molecular mechanisms of action.
Examination Format/Assessment Methods	:	45% midterm exam, 45% final exam, 10% quiz
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Neal, M.J., 2014, Medical Pharmacology at A Glance, 7th Edition, Wiley-Blackwell, UK. 2. Stringer, J.L., 1996, Basic Concepts in Pharmology: A Student's Survival Guide, 2nd Edition, McGraw-Hill, USA. 3. Lullmann, H., Mohr, K., Ziegler, A., Bieger, D., 2000, Colour Atlas of Pharmacology, 2nd Edition revised and expanded, Thieme Stuttgart, New York. Additional : 4. Brunton, L., Chabner, B., Knollman, B., 2011, Goodman and Gilman's The Pharmacological Basis of Therapeutics, 12th Edition, McGraw-Hill, USA. 5. Ikawati, Z., 2014, Buku Farmakologi Molekuler, UGM Press.

Date of last amendment: 8 August 2022

Module 12: Pharmaceutics II

Pharmaceutics II (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221204/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Dr. apt. Chairun Wiedyaningsih, M.Kes., M.App.Sc. (Coordinator) 2. apt. Niken Nur Widyakusuma, M.Sc. 3. apt. Fathul Muin, M.Pharm. 4. Prof. Dr. apt. Susi Ari Kristina, M.Kes.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Team-based Project, where students will be divided into group of four/five, then given a task to be completed together (interviewing a real practicing pharmacist about experience in handling incompatibilities). The task will be made in the form of a short report and be discussed together. All students from different class may access all the reports. 50 minutes per week for 14 weeks in one semester
Workload	:	50 minutes of in-class lectures 60 minutes of structured assignment activities 60 minutes of independent activities In total 170 minutes/week In 16 weeks = 2720 minutes = 45.335 hours 1 ECTS = 28 hours
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmaceutics I (FAF 221107)
Course Learning Outcomes (CLO)	:	1. Students can explain the general provisions and requirements for dispensing medicines: facilities, infrastructure, personnel, and compounding guidelines as well as examples of their application in standard formulas

		2. Students can explain preparation methods for compounding pharmaceutical preparations, drug storage, expiry date, and beyond use date 3. Students can solve calculation problems in compounding pharmaceutical preparations and calculating doses 4. Students can explain cases of incompatibility in pharmaceutical preparations
Description	:	Pharmaceutics II course discusses about aspects of drug compounding on a small scale (community pharmacy) so that it can become the basis for development on a large scale (industry). The contents of the Pharmaceutics II includes general provisions and requirements for dispensing medicines: facilities, infrastructure, personnel, Standard Operational Procedures (including weighing), calculating formulas/calculations in compounding medicines, labels, changing dosage forms, introduction to various kinds of standard prescriptions - internal use and external use medicines, preparation methods for solid, semisolid and liquids, incompatibility in drug compounding, drug storage, expiry date and beyond use date.
Examination Format/Assessment Methods	:	50% midterm exam, 50% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Banker, G.,S., Rhodes, C.T., 1996, Modern Pharmaceutics, 3rd Ed., Marcel Dekker, Inc., New York 2. Dipiro, J.T., Talbert, R.L., Yee., G.C., et al., eds 2002, Pharmacotherapy: A Patophysiologic Approach, 5th Ed., Mc Graw-Hill, New York. 3. Florence, A.T., Salole, E.G., 1990, Formulations Factors in Adverse Reactions, Wright, London. 4. Rowland, M., Tozer, TN., 1995 Clinical Pharmacokinetics, Concepts and Applications, 3rd Ed., Lippincott, Williams & Wilkins. 5. Rodrigues, AD 2002, Drug-Drug Interactions, Marcel Dekker, Inc 6. Van Arkel, C.G, Nainggolan, S.P., 1963, Tak tercampurkannya obat-obatan. Jakarta: PT Saksama

Date of last amendment: 8 August 2022

Module 13: Physical Pharmacy II

Physical Pharmacy II (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221206/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Apt Marlyn Dian Laksitorini MSc., PhD (coordinator) 2. Apt Adhyatmika M. Biotech., PhD 3. Dr. Apt. Sekar Ayu Pawestri M.Sc. 4. Dr. Nindya Kusumorini, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	50 minutes per week for 14 weeks in one semester
Workload	:	50 minutes of in-class lectures 60 minutes of structured assignment activities 60 minutes of independent activities In total 170 minutes/week In 16 weeks = 2720 minutes = 45.335 hours 1 ECTS = 28 hours
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Physical Pharmacy I (FAF 221108)
Course Learning Outcomes (CLO)	:	1. Students are able to understand and apply the principle of facial tension in the pre-/formulation of drug preparations, as well as drug adsorption at the interface to produce therapeutic effects. 2. Students are able to understand the formulation process of medicinal preparations based on the properties of colloidal dispersions, suspensions and emulsions. 3. Students are able to understand and identify the influence of flow properties and particle properties for the basis of pre-/formulation of medicinal preparations, the influence of hygroscopicity on the stability of the preparation.

		4. Students are able to apply the principles of diffusion in preparing drug formulations. 5. Students are able to experimentally test the solubility, partition coefficient, particle size, flow properties, colloidal dispersion of drug compounds and their applications in pharmacy.
Description	:	The Physical Pharmacy II course consists of learning through lectures (1 credit) and practicum (1 credit). Overall, the Physical Pharmacy II course contains material on the subject matter.
Examination Format/Assessment Methods	:	10% Discussion, 5% quiz, 5% assignment, 25% project, 5% Practical work final exam, 25% midterm exam, 25% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Allen, T., 2003, Powder Sampling and Particle Size Determination, Elsevier, Amsterdam. 2. Aulton, M.E. (Ed.), 2004, Pharmaceutics: The Science of Dosage Form Design, 2nd Ed., ELBS, Hongkong. 3. Cussler, E.L., 2007, Difussion: Mass Transfer in Fluid Systems, 3rd Ed., Cambridge University Press, Cambridge, London. 4. Florence, A.T. & Attwood D., 2006, Physiochemical Principles of Pharmacy, 4th Ed., Pharmaceutical Press, London. 5. Sinko, P.J., 2011, Martin's Physical Pharmacy and Pharmaceutical Sciences, 6th Ed., Lippincott Williams & Wilkins, A Wolters Kluwer Co., Philadelphia.

Date of last amendment: 8 August 2022

Module 14: Social and Behavioral Sciences of Pharmacy

Social and Behavioral Sciences of Pharmacy (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221208/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Prof. Dr. Susi Ari Kristina,M.Kes, Apt (coordinator) 2. Anna Wahyuni Widayanti, MPH., Apt., Ph.D. 3. Niken Nur Widyakusuma,M.Sc.,Apt 4. Rizka Prita Yuliani, M.Pharm.,Sci., Apt
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Team-based Project 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. Students are able to explain the concepts and definitions of health behavior, behavior theory and behavior change and their application in pharmaceutical services 2. Students are able to apply the concepts of health and illness, social determinants of health and health seeking behavior to explain the results of observations in community settings 3. Students are able to examine situations related to social phenomena such as social stigma, medical pluralism, and non-adherence to medication 4. Students are able to understand the principles of effective communication and explain their application in interprofessional partnerships.
Description	:	Overall, the Social and Behavioral Sciences of Pharmacy discusses the subject matter including concepts, methods and theories of sociology and psychology as well as their application in pharmaceutical services. The

		application of social and behavioral science theory and methodology is realized in pharmaceutical practice in order to provide pharmaceutical services to patients with a biopsychosocial approach, health promotion, and appropriate health seeking behavior through effective communication. Up to date case studies are provided to support professional attitudes and provide holistic and optimal pharmaceutical services.
Examination Format/Assessment Methods	:	10% Participatory activities, 405 project, 25% midterm exam, 25% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Glanz K, Rimer BK, 2008, Lewis FM. Health Behavior and Health Education. Fifth Edition, San Francisco: Jossey-Bass 2. Donyai P, 2012, Social and Cognitive Pharmacy, Theories and Case Studies, London, Pharmaceutical Press 3. Griffin E, 2006, A first look at communication theory (6th ed.). New York: McGraw-Hill 4. von Wagner C, Steptoe A, Wolf MS, Wardle J, 2009, Health literacy and health actions: a review and a framework from health psychology. Health Educ Behav ;36(5):860-877 5. Harding, G., Nettleton, S., & Taylor, K. (1990). Sociology for pharmacists: An introduction. Macmillan International Higher Education. 6. Kroeger, A. (1983). Anthropological and socio-medical health care research in developing countries. Soc. Sci. Med., 17(3), pp. 147-161. 7. Osterberg, L., & Blaschke, T. (2005). Adherence to Medication. New England Journal of Medicine, 353(5), pp. 487-497. 8. Keleher H., MacDougall C., Murphy B., 2007, Understanding Health Promotion, Australia: Oxford University Press. 9. Speedie MK, Baldwin JN, Carter RA, Raehl CL, Yanchick VA, Maine LL, 2012, Cultivating 'habits of mind' in the scholarly pharmacy clinician: report of the 2011-2012 Argus Commission. Am J Pharm Educ. ;76(6): Article S3.

Date of last amendment: 8 August 2022

Module 15: Analytical Chemistry I

Analytical Chemistry I (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221209/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Dr.rer.nat. Tatang Irianti 2. Prof. Dr. Abdul Rahman 3. Dr. Halida Rahmania
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Team-based Project/Case-based Learning/PBL 50 minutes per week for 14 weeks in one semester
Workload	:	50 minutes of in-class lectures 60 minutes of structured assignment activities 60 minutes of independent activities In total 170 minutes/week In 16 weeks = 2720 minutes = 45.335 hours 1 ECTS = 28 hours
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Basic Pharmaceutical Chemistry (FAF 221109)
Course Learning Outcomes (CLO)	:	1. Able to discuss the appropriate volumetric method for the analysis of drugs or drug substances based on the structure of drug compounds 2. Able to correctly demonstrate the process of volumetric analysis of drugs or drug ingredients 3. Able to process data and evaluate the results of drug analysis or drug ingredients and state whether a drug or drug substance meets the requirements
Description	:	The Analytical Chemistry course 1 discusses the basic problems of volumetric quantitative analysis of drug compounds which include: acidi-alkalimetry, water-free titration, reduction-oxidimetry (iodo-iodimetry, permanganometry, serimetry, bromo-bromatometry, nitrimetry), complexometry, precipatometry (argentometry), and electrometry (potentiometry, voltammetry, coulometry).

Examination Format/Assessment Methods	:	20% task, 40% midterm exam, 40% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	The Main: 1. Kar, A, 2005, Pharmaceutical Drug Analysis, Age Int. Limited Publisher, New Delhi 2. Vogel's, 1989, Texxbook of quantitative analysis, 5th Ed, Longmans, Green and Co, London, New York, Toronto 3. Watson, D.G., 1999, Pharmaceutical Analysis: A Textbook for Pharmacy Students and Pharmaceutical Chemist, 2nd Ed, ChurcilLivingson, UK 4. Miller, J.M.; Miller, J.C. Statistics and Chemometrics for Analytical Chemistry, Fifth. ed., Pearson Education Limited, London, 2005; 213-219, 234-236 5. Anonim, 2018, United States Pharmacopoeia, New York, USA

Date of last amendment: 8 August 2022

Module 16: Organic Chemistry II

Organic Chemistry II (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221211/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Prof. Dr. Ritmaleni, S.Si. (Coordinator) 2. Dr. Hilda Ismail, M.Si., Apt. 3. Dr. Artania Adnin Tri Suma, S.Si. 4. Dr. Sci. apt. Rohmad Yudi Utomo, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Tutorial and discussion 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Organic Chemistry I (FAF221111)
Course Learning Outcomes (CLO)	:	1. understand the basic concept of Nuclephilic Addition Reaction on aldehyde and keton 2. understand the basic concept of Nuclephilic Substitution Reaction on Catboxylic acid and its derivatives 3. understand the basic concept of Alpha Substitution and condensation Reaction on carbonyl compounds 4. understand the basic concept of carbohydrate, nucleic acid, lipid, amino acid and protein in Organic Chemistry
Description	:	Organic Chemistry Course II will be emphasised on the understanding of the reaction mechanisms of carbonyl compounds with different nucleophiles, its application to carbohydrate, nucleic acid, lipid, amino acid and protein molecules and also to the basic concept of drug synthesis.

Examination Format/Assessment Methods	:	20% Assignment, 40% midterm exam, 40% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Mc.Murry, J. 2012, Organic Chemistry 2. Clayden et al., 2012, Organic Chemistry
Date of last amendment: 8 August 2022		

Module 17: Pharmacy Management

Pharmacy Management (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221213/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Dr. apt. Dwi Endarti, M.Sc (Koordinator) 2. Prof. Dr. apt. Satibi, M.Si 3. Prof. Dr. apt. Susi Ari Kristina, M. Kes 4. Apt. Fathul Muin, M.Pharm.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Project (Team-based Project)/Case based learning 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Social Science and Behavioral of Pharmacy (FAF221208) → co req
Course Learning Outcomes (CLO)	:	1. Understand concepts and be able to solve pharmaceutical service problems by implementing drug management which includes the

		stages of selection, planning, procurement, storage, distribution and use. 2. Understand concepts and be able to solve pharmaceutical service problems by implementing management support which includes strategic management, financial management, HR management, marketing management, and management information systems.
Description	:	Pharmacy management courses discuss the basics and applications of organizational management, human resource management, operations management, financial management, marketing management, and strategic management in the pharmaceutical field.
Examination Format/Assessment Methods	:	10% Participatory activities, 40% project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 3. Dessele, P., Shane, Z., David, P., 2005, Pharmacy Management Assentials for All Practice Setting, The McGraww-Hill Compony, USA. 4. Herist, K.N., Rollins, B., dan Perri, M., 2011, Financial Analysis in Pharmacy Practice, Pharmaceutical Press, India. 5. Kotler, P. dan Keller, K., 2012, Marketing Management, 14thed, Prentice Hall inc, Sadle River, New Jersey. 6. Porter, M.E., 2007, Strategi Bersaing (terjemahan), Karisma Publising Group, Tangerang. 7. Robbins, S.P., dan Coulter, M., 2010, Manajemen (terjemahan), Erlangga, Indonesia 8. Quick, J.D., Rankin, J.R, Laing, R.O., O'Connor., R.W., 2011, Managing Drug Supply, 3th edition, Kumarin Press, West Harford, USA. 9. Wheelen, T.L., dan Hunger, J.D., 2010, Strategic Management and Business Policy, 12th edition, Pearson Education, USA Additional : 1. Relevant articles

Module 18: Molecular Biology Practical Work

Molecular Biology Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221202/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	4. Dr. rer . nat . apt . Adam Hermawan, S.Farm ., M.Sc. (Coordinator) 5. Dr. apt . Muthi' Ikawati, M.Sc. 6. Prof. Dr. apt . Edy Meiyanto , M.Sc. 7. apt . Rumiyati, S.Si., M.Sc., Ph.D. 8. apt . Setyowati Triastuti Utami, S.Farm ., M.Sc., Ph.D. 9. Dr. Riris Istighfari Jenie , M.Si., Apt . 10. M Novrizal Abdi Sahid, S. Farm ., M. Eng ., Ph. D., Apt . 11. Dr. apt . Rohmad Yudi Utomo, M.Sc. 12. Dr. err . nat . apt . Siti Nurul Hidayah, S.Farm ., M.Sc. 13. Puguh Indrasetiawan , S.Farm ., M.Sc., Ph.D., Apt . 14. Dr. Djoko Santosa, M.Si. 15. Dr. apt . Puji Astuti, S.Si., M.Sc. 16. Purwanto, M.Sc., Ph.D., Apt . 17. Dr. Sylvia Utami Tunjung Pratiwi, S.Si., M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Flipped learning , students study material individually which is uploaded on eLOK . 2. Lecturer tutorials 3. Case-based learning/PBL/SCL Method and Practicum Practical work : Students are designed to gain technical skills in the lab, discuss, work in groups and independently to solve specific problems/cases, analyze and interpret data, and write reports 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmaceutical Biochemistry (FAF 221103) Cell Biology-Microbiology (FAF 221105)
Course Learning Outcomes (CLO)	:	1. Students can explain the properties of genetic material, predict mutations, and repair mutations (repair) in biological systems. 2. Students can predict genetic diversity (polymorphism) and genetic transformation and use this knowledge to explain differences in individual responses to drugs.

		3. Student can compare regulation gene expression (transcription and translation) in prokaryotic and eukaryotic biological systems 4. Student can use acquired knowledge of molecular biology For explain pathophysiology disease cancer (carcinogenesis) at the molecular level
Description	:	Molecular Biology Practicum are devided into 2 topics : wet work laboratory and dry lab. Work laboratory Includes : Introduction culture cell and cytotoxicity test, DNA isolation and analysis DNA purity, Identification polymorphism a gene uses the polymerase chain Reaction (PCR)-Restriction Fragment Length Polymorphism (RFLP), analysis PCR products with agarose gel electrophoresis; practicum dry lab includes : introduction bioinformatics based NCBI BLAST and identification of gene expression with GEO and DAVID.
Examination Format/Assessment Methods	:	15% Pretest, 10% performance, 50% response, 25% report.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Davis, LG, Kuehl, WM, and Battey, JF, 1994, Basic Methods in Molecular Biology 2nd Edition , Appleton and Lange, Norwalk, Connecticut. 2. Sambrook and Russell, 2001, Molecular Cloning: A Laboratory Manual 3rd edition , Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York. 3. Ausubel F M, Brent R, Kingston RE, Moore DD, Seidman JG, Smith JA, and Struhl K, 2002, Short Protocols in Molecular Biology , 5th Ed ., Wiley , New York . 4. Source latest other Which related (internet etc) Addition : 5. Hermawan, A., M. Ikawati, RI Jenie , A. Khumaira, H. Putri, IP Nurhayati, SM Angraini, and HA Muflikhasari . 2021. ' Identification of potential therapeutic target of naringenin in breast cancer stem cells inhibition by bioinformatics and in vitro studies ', Saudi Pharm J , 29: 12-26. 6. Hermawan, A., M. Ikawati, A. Khumaira, H. Putri, RI Jenie , SM Angraini, and HA Muflikhasari . 2021. ' Bioinformatics and In Vitro Studies Reveals the importance of p53, PPARG and Notch signaling Pathway in Inhibition of Breast Cancer Stem cells by Hesperetin ', Adv Pharm Bull , 11: 351-60. 7. Hermawan, A., H. Putri, N. Hanif, N. Fatimah, and HH Prasetio. 2022. ' Identification of potential target genes of honokiol in overcoming breast cancer resistance to tamoxifen ', Front Oncol , 12:1019025.

8. Hermawan, A., F. Wulandari, N. Hanif, RY Utomo, RI Jenie , M. Ikawati, and AS Tafrihani . 2022. ' Identification of potential targets of the curcumin analog CCA-1.1 for glioblastoma treatment : integrated computational analysis and in vitro studies', Sci Rep , 12:13928.
9. Other related recent sources (scientific articles from internationally reputed journals)

Note : Including reference sources from the form of integration of Research and/or PkM into courses.

Date of last amendment: 8 August 2022

Module 19: Pharmaceutics Practical Work II

Pharmaceutics Practical Work II (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221205/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Prof. Dr. apt. Satibi, M.Si. 2. Prof. Dr. apt. Susi Ari Kristina, M.Kes. 3. Dr. apt. Chairun Wiedyaningsih, M.Kes., M.App.Sc. 4. Dr. apt. Dwi Endarti, M.Sc. 5. Dr. apt. Anna Wahyuni Widayanti, MPH. 6. Dr. apt. Bondan Ardiningtyas, M.Sc. 7. apt. Niken Nur Widyakusuma, M.Sc. 8. apt. Muvita Rina Wati, M.Sc. 9. apt. Rizka Prita Yuliani, M.Pharm. 10. apt. Fathul Muin, M.Pharm..
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using individual practice in the laboratory 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmaceutics I (FAF 221107)
Course Learning Outcomes (CLO)	:	Students can compound pharmaceutical preparations
Description	:	The contents of Practicum of Pharmaceutics II consists of compounding solid, semi-solid and liquid pharmaceutical preparations (pulvis, pulveres, capsulae, pillulae, cremores, unguentum, pastee, suppositories, solutio, mixtura, infusa and saturationes)
Examination Format/Assessment Methods	:	50% Participatory Activities*, 50% Final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Banker, G.,S., Rhodes, C.T., 1996, Modern Pharmaceutics, 3rd Ed., Marcel Dekker, Inc., New York 2. Dipiro, J.T., Talbert, R.L., Yee., G.C., et al., eds 2002, Pharmacotherapy: A Patophysiologic Approach, 5th Ed., Mc Graw-Hill, New York.

3. Florence, A.T., Salole, E.G., 1990, Formulations Factors in Adverse Reactions, Wright, London.
4. Rowland, M., Tozer, TN., 1995 Clinical Pharmacokinetics, Concepts and Applications, 3rd Ed., Lippincott, Williams & Wilkins.
5. Rodrigues, AD 2002, Drug-Drug Interactions, Marcel Dekker, Inc
6. Van Arkel, C.G, Nainggolan, S.P., 1963, Tak tercampurkannya obat-obatan. Jakarta: PT Saksama

Date of last amendment: 8 August 2022

Module 20: Physical Pharmacy II Practical Work

Physical Pharmacy II Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221207/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Dr. apt. Sekar Ayu Pawestri, S.Farm. (Coordinator) 2. Prof. Dr. apt. Akhmad Kharis Nugroho, M.Si. 3. Prof. Dr. apt. Abdul Karim Zulkarnain, M.Si. 4. Dr. apt. Adhyatmika, M.Biotech. 5. apt. Marlyn Dian Laksitorini, M.Sc., Ph.D 6. Dr. apt. Nindya Kusumorini, S.Farm.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Team-based project 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Physical Pharmacy I (FAF 221108)
Course Learning Outcomes (CLO)	:	Students are able to test experimentally solubility, partition coefficient, particle size, rheology, colloidal dispersion of drug compounds and their application in pharmacy.
Description	:	Physical Pharmacy Practicum II studies and practices directly the intrinsic solubility and total solubility, drug partition coefficient, the average size of drug particles sieving and microscopically, rheological measurements, and colloidal dispersion properties.
Examination Format/Assessment Methods	:	10% Pretest, 30% Performance, 30% Final test (OSCE-like), 30% Project result.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Florence, A.T. & Attwood D., 2006, Physiochemical Principles of Pharmacy, 4th Ed., Pharmaceutical Press, London. 2. Sinko, P.J., 2011, Martin's Physical Pharmacy and Pharmaceutical Sciences, 6th Ed., Lippincott Williams & Wilkins, A Wolters Kluwer Co., Philadelphia. Additional : 3. Physical Pharmacy II Practicum Instruction

Date of last amendment: 8 August 2022

Module 21: Analytical Chemistry I Practical Work

Analytical Chemistry I Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221210/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Dr. apt. Agustina Ari Murti Budi Hastuti, M.Sc. (coordinator) 2. apt. Eka Noviana, M.Sc., Ph.D. 3. Dr. rer. nat. apt. Siti Nurul Hidayah, M.Sc. 4. Dr. Artania Adnin Tri Suma, S.Si. 5. apt. Navista Sri Octa Ujiantari, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Team-based Project and Practicum 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Basic Pharmaceutical Chemistry (FAF 221109)
Course Learning Outcomes (CLO)	:	1. Able to demonstrate correctly the process of volumetric analysis of drugs or medicinal substances 2. Able to process data and evaluate the results of drug or drug substance analysis and state whether a drug or drug substance meets the requirements
Description	:	The Analytical Chemistry 1 course discusses the basics of volumetric quantitative analysis of drug compounds which include: acidi-alkalimetry, water-free titration, reduction-oxidimetry (iodo-iodi-iodatometry, permanganometry, serimetry, bromo-bromatometry, nitrimetry), complexometry, prespatometric (argentometry), and electrometry (potentiometric, voltammetry, coulometric).
Examination Format/Assessment Methods	:	20% Pretest, 10% Lab work, 25% Practical Final test, 25% written final test, 20% Practical report.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Kar, A, 2005, Pharmaceutical Drug Analysis, Age Int. Limited Publisher, New Delhi 2. Vogel's, 1989, Textbook of quantitative analysis, 5th Ed, Longmans, Green and Co, London, New York, Toronto

3. Watson, D.G., 2012, Pharmaceutical Analysis, A Textbook for Pharmacy Students and
4. Pharmaceutical Chemists, Third Edition, Churchill, Livingstone, Elsevier, London.
5. Miller, J.M.; Miller, J.C. Statistics and Chemometrics for Analytical Chemistry, Fifth. Ed.,
6. Pearson Education Limited, London, 2005; 213-219, 234-236
7. Anonim, 2018, United States Pharmacopoeia, New York, USA

Date of last amendment: 8 August 2022

Module 22: Organic Chemistry Practical Work II

Organic Chemistry Practical Work II (1 Credit/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221212/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	1. Dr. Artania Adnin Tri Suma, S.Si. (Coordinator) 2. Prof. Dr. Ritmaleni, S.Si.. 3. Dr. apt. Hilda Ismail, M.Si. 4. Dr. Cintya Nurul Apsari, S.T.P., M.Si. 5. Dr. Sci. apt. Rohmad Yudi Utomo, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	The learning will be carried out using several methods: 1. Flipped learning, where students study independently 2. Tutorial, where students listen to the lecturer's explanation 3. Discussion, where students ask questions or answer 4. Team-based projects, where students are divided into groups, then given group assignments to complete together and the completion of the tasks will be made in the form of presentations and short reports 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credit/1.6 ECTS
Prerequisites	:	Organic Chemistry I (FAF221111)
Course Learning Outcomes (CLO)	:	1. Students are able to apply the oxidation reaction of primary alcohol compounds in the synthesis of aldehyde group compounds 2. Students are able to apply nucleophilic acyl substitution reactions of acid anhydride compounds in the synthesis of amide group compounds 3. Students are able to apply the oxidation reaction of primary alcohol compounds in the synthesis of carboxylic acid group compounds 4. Students are able to apply the alpha substitution reaction of ketone compounds in the synthesis of haloform group compounds 5. Students are able to apply the carbonyl condensation reaction in the synthesis of dibenzalacetone compounds
Description	:	This practical work contains topics related to the principles and reaction methods involved in the synthesis of organic compounds, such as acetaldehyde, paracetamol, benzoic acid, iodoform, and pentagamavuton-0 (PGV-0). It also addressed the principles and techniques for purifying

		synthesized compounds, as well as the principles and techniques for qualitative identification of the synthesized compounds.
Examination Format/Assessment Methods	:	10% Lab work, 15% Presentation, 25% Project, 15% Practical report, 35% Practical Final Test.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Major : 1. Clayden, J., Greeves, N. and Warren, S., 2012, Organic Chemistry 2nd ed., Oxford University Press Inc., New York. 2. Fessenden, R.J. and Fessenden, J.S., 1982, Organic Chemistry 2nd ed., Willard Grant Press, Boston. 3. McMurry, J., 2016, Organic Chemistry 9th ed., Cengage Learning, Boston 4. Smith, J.G., 2008, Organic Chemistry 3rd ed., McGraw-Hill, New York. 5. Williamson, K.L. and Masters, K.M., 2011, Macroscale and Microscale Organic Experiments 6th ed., Brooks/Cole, Belmont. Addition : 6. Ritmaleni, Hastutitama, A.N.A., Persitamaian, I., Restiwardani, T., Eksakta, A., Munandar, R.F., Abdullah, M.S., Purwanto, A.E., Astuti, P., and Sardjiman, 2021, Synthesis and Antibacterial Activity of Dibenzylidene-Cyclohexanone, Rasayan J. Chem, 14(3), 2090-2096.

Date of last amendment: 8 August 2022

Module 23: Pharmacokinetics

Pharmacokinetics (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF221301/Compulsory
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	Support Team: apt. Arief Rahman Hakim, M.Si. (Koordinator) Dr. apt. Purwantiningsih, M.Si. apt. Sisca Ucche, M.Pharm.Sc., Ph.D
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Students are designed to gain experience in listening to lecturers' explanations, discussing, expressing opinions, working independently or working in groups to solve a given case. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	Anatomy of Human Physiology, Pharmacology I
Course Learning Outcomes (CLO)	:	1. Students are able to explain the definition and benefits of pharmacokinetics and their relationship with other fields of science, kinetics order, compartment model and pharmacokinetic parameters, and are able to determine drug pharmacokinetic parameters using an open single-compartment model after intravascular administration of blood and urine data. 2. Students were able to determine the pharmacokinetic parameters of the drug using a two-compartment open model after intravascular and extravascular administration. 3. Students were able to determine drug pharmacokinetic parameters using an open-compartment model after extravascular administration using blood data, and drug pharmacokinetics using the non-compartmental model method
Description	:	This course contains topics about the fate of drugs in the body (absorption, distribution, metabolism and excretion), definition of pharmacokinetics, order of kinetics, pharmacokinetics models, pharmacokinetics parameters. The determination of drug pharmacokinetics parameters uses a compartment model, both an open single-

		compartment model and an open-two-compartment model, a non-compartmental drug pharmacokinetics model. In the pharmacokinetics course, emphasis is placed on the determination of drug pharmacokinetics parameters and parameter hierarchy.
Examination Format/Assessment Methods	:	30% Assignment, 30% Quiz, 20% midterm exam, 20% final exam.
Learning Media	:	https://elok.ugm.ac.id Offline: 75%; Online: 25%
Literature	:	Main: 1. Shargel, L. dan Yu, A.B.C., 2016, Applied Biopharmaceutics and Pharmacokinetics, 7th ed., McGraw- Hill Education, New Yor 2. Hakim, L., 2017, Pharmacokinetics, 2nd Edition, Yogyakarta Science Exchange Addition: 3. Ritschel WA & Kearns GL(2004) Handbook of Basic Pharmacokinetics, 6 ed.,American Pharmacist Association, Washington 4. Tozer, TN & Rowland, M (2006) Introduction to Pharmacokinetics and Pharmacodynamics – A Quantitative Basis of Drug Therapy. Lippincott Williams & Wilkins, Philadelphia 5. Hedaya M.A., 2007, Basic Pharmacokinetics, CRC Press Boca Raton, New York
Date of last amendment	:	8 August 2022

Module 24: Experimental Pharmacology and Toxicology I

Experimental Pharmacology and Toxicology I (1 Credit/1.6 ECTS)		
Advanced Pharmacy Practice		
Code/Status	:	FAF 221302/Compulsory
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	Dr. apt. Soni Siswanto, M.Biomed Prof. Dr. apt. Agung Endro Nugroho, M.Si. Dr. apt. Arief Nurrochmad, M.Si., M.Sc. apt. Purwantiningsih, M.Si., Ph.D. Dr. apt. Nunung Yuniarti, M.Si. drh. Retno Murwanti, MP., Ph.D. apt. Arief Rahman Hakim, M.Si. Dr. apt. Dyaningtyas Dewi, M.Sc. apt. Sisca Ucche, Ph.D,
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Case-based Learning 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	(1 Credit/1.6 ECTS)
Prerequisites	:	Pharmacology 1
Course Learning Outcomes (CLO)	:	1. Students can describe the principles of experimental pharmacology, in silico, in situ, in vitro, ex vivo, ex-ovo, and in vivo; they can identify and explain information on various routes of pharmaceuticals administration to test animals and analyze their effects on drug absorption. 2. Students can identify and explain information on drug metabolism and the elements that impact it, as well as assess it. 3. Students can find and explain information regarding the timing of sampling and assumptions of compartment models and selection of doses in pharmacokinetics; determination of pharmacokinetic parameters of a drug after administration of a single dose; and have skills in taking samples of experimental animals. 4. Students can find and explain information about dose-response relationships based on quantal responses and gradual responses.

5. Students can find and explain information about the dose-response relationship in analgesic and anti-inflammatory tests.

Description	:	Animal handling, basic techniques for drug administration, understanding of drug metabolism and the factors that influence it, how to analyze drugs in blood and urine and validate them, test pharmacological activity: anti-inflammatory, analgesic, antipyretic, sedative-hypnotic, evaluation of dose-response relationship, i.e. evaluation of gradual and quantal response, application of statistical software in probit analysis are all covered in the Experimental Pharmacology and Toxicology Course. The learning approach is practicum, which is immediately followed by questions and answers, as well as discussion, to ensure that students comprehend each of the sub-subjects presented. While the technique of evaluation is based on pretest scores, lab activity performance, reports, conversations, and replies.
Examination Format/Assessment Methods	:	Activity 25%, Interim report 10%, Final report 15%, Response test 40%, Quiz 10%
Learning Media	:	Offline learning utilizing eLOK as LMS. 25% online learning with zoom platform
Literature	:	Main: 1. Neal, M.J., 2014, Medical Pharmacology at A Glance, 7th Edition, Wiley-Blackwell, UK. 2. Stringer, J.L., 1996, Basic Concepts in Pharmology: A Student's Survival Guide, 2nd Edition, McGraw-Hill, USA. 3. Lullmann, H., Mohr, K., Ziegler, A., Bieger, D., 2000, Colour Atlas of Pharmacology, 2nd Edition revised and expanded, Thieme Stuttgart, New York. Additional: 4. Brunton, L., Chabner, B., Knollman, B., 2011, Goodman and Gilman's The Pharmacological Basis of Therapeutics, 12th Edition, McGraw-Hill, USA. 5. Clementi F dan Fumagalli G, 2015, General and Molecular Pharmacology: Principles of Drug Action, John Wiley and Sons, New Jersey, USA 6. Relevant scientific article
Date of last amendment	:	8 August 2022

Module 25: Pharmacology II

Pharmacology II (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice

Code/Status	:	FAF 221303/Compulsory
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	Dr. Nunung Yuniarti, M.Si., Apt. Prof. Dr. Agung Endro Nugroho, M.Si., Apt. Dr. Arief Nurrochmad, M.Si., M.Sc., Apt. Dr. Dyaningtyas Dewi PP., M.Sc., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	Pharmacology 1

Course Learning Outcomes (CLO)	:	1. Students are able to master theoretical concepts about drug interactions various targets of action, and various types of receptors and their signal transduction 2. Students are able to find and explain information about mechanisms molecular action of drugs that affect the endocrine system 3. Students are able to find and explain information about mechanisms molecular action of drugs on the cardiovascular system and digestive system 4. Students are able to search for and explain information regarding the molecular mechanisms of action of inflammatory drugs: analgesics, anti-inflammatories, antipyretics, antihistamines 5. Students are able to search for and explain information regarding the molecular mechanisms of action of corticosteroid drugs, immunosuppressants and drugs on the respiratory system and antibiotic drugs 6. Students are able to search for and explain information regarding the molecular mechanisms of action of drugs as antiparasitic, antineoplastic, antiviral and antifungal
Description	:	Pharmacology II contains a discussion of drug interactions and receptors as targets of drug action, various receptors based on signal transduction, pharmacology and molecular mechanisms of drug action on the cardiovascular system (anticoagulant, antiplatelet, antihyperlipidemia, atherosclerosis), respiratory system (bronchodilator, mucolytic, antitussive, secretion inhibitor mucus), endocrine system (antithyroid, antiandrogen, antidiabetic, estrogen-progestin), digestive system (antiemetic, antacid, laxative, H2 receptor antagonist, proton pump inhibitor), and pharmacology of anti-inflammatory drugs, antipyretic analgesics, antihistamines, corticosteroids and immunosuppressants, antibiotics , antiparasitic, antiviral, antifungal and antineoplastic
Examination Format/Assessment Methods	:	Interim report 45%, Final report 50%, Quiz 5%
Learning Media	:	eLOK Praktikum

Literature	:	Main: 1. Neal, M.J., 2014, Medical Pharmacology at A Glance, 7th Edition, Wiley-Blackwell, UK. 2. Stringer, J.L., 1996, Basic Concepts in Pharmology: A Student's Survival Guide, 2nd Edition, McGraw-Hill, USA. 3. Lullmann, H., Mohr, K., Ziegler, A., Bieger, D., 2000, Colour Atlas of Pharmacology, 2nd Edition revised and expanded, Thieme Stuttgart, New York. 4. Brunton, L., Chabner, B., Knollman, B., 2011, Goodman and Gilman's The Pharmacological Basis of Therapeutics, 12th Edition, McGraw-Hill, USA. 5. Ikawati, Z., 2014, Buku Farmakologi Molekuler, UGM Press. 6. Clementi F dan Fumagalli G, 2015, General and Molecular Pharmacology: Principles of Drug Action, John Wiley and Sons, New Jersey, USA 7. Putri, D.D.P., Kawasaki, T., Murase, M., Sueyoshi, T., Deguchi, T., Ori, D., Suetsugu, S. and Kawai, T., 2019. PtdIns3P phosphatases MTMR3 and MTMR4 negatively regulate innate immune responses to DNA through modulating STING trafficking. Journal of Biological Chemistry, 294(21), pp.8412-8423. 8. Putri, D.D.P., Sarmoko, S., Febriansah, R., Puspitasari, E., Ismiyati, N. and Fitriasari, A., 2011. MCF-7 Resistant Doxorubicin are Characterized by Lamelapodia, Strong Adhesion on Substrate and P-gp Overexpression. Indonesian Journal of Cancer Chemoprevention, 2(3), pp.304-309. 9. Other related journals
Date of last amendment	:	8 August 2022

Module 26: Solid Form Formulation and Technology

Solid Form Formulation and Technology (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221304/Compulsory
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	Prof. Dr. apt. T.N. Saifullah, M.Si. (Koordinator) Dr. Ronny Martien, M.Si. Dr.Eng. apt. Khadijah, M.Si. Farida Nur Aziza, MGMP., Apt,
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Case-Based Learning (CBL) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	Pharmaceutic, Physical Pharmacy
Course Learning Outcomes (CLO)	:	1. Able to apply science and technology pharmacy latest in design, manufacture, guarantee quality, and distribution preparation pharmacy administration to test animals and analyze their effects on drug absorption. 2. Student capable make a solid dosage form with notice guarantee 3. Student capable evaluate the quality of formula
Description	:	Formulation and Technology Solid Preparations discuss about: tablet preparations, types and methods its use; tablet properties and their evaluation, tablet formulation, methods manufacture of tablets and equipment, internal problems tablets, sugar coated tablets, thin coated tablets, coating (granule, particle, compression), other types of tablets (coated, *effervescent*, sublingual, buccal, suction, *fast*

		dissolving tablet (FDT)), formulation capsules (hard, soft), equipment charging capsule.
Examination Format/Assessment Methods	:	Pretest 15%, Work 30%, Report Practice 20%, Response test 35%
Learning Media	:	https://elok.ugm.ac.id Offline: 100%; Online: 0%
Literature		Main: 1. Gonnissen Y, Remon JP, Vervaet C. Effect of maltodextrin and superdisintegrant in directly compressible powder mixtures prepared via co-spray drying. Eur J Pharm Biopharm. 2008;68(2):277–82. 2. Breitenbach J. Melt extrusion: from process to drug delivery technology. Eur J Pharm Biopharm. 2002;54(2):107–17. 3. Wang J, Wen H, Desai D. Lubrication in tablet formulations. Eur J Pharm Biopharm [Internet]. 2010;75(1):1–15. Available from: http://dx.doi.org/10.1016/j.ejpb.2010.01.007 4. Augsburger, L.L. & Hoag, S.W., 2008, Pharmaceutical Dosage Form: Tablets, 3rd Ed., Vol. I: Unit Operations and Mechanical Properties, Informa Healthcare, New York. 5. Banker, G.S. & Rhodes, C.T., 2002, Modern Pharmaceutics, 4th Ed., Marcel Dekker Inc., New York. 6. Niazi, K.S., 2009, Handbook of Pharmaceutical Manufacturing Formulations Compressed Solid Product, Vol. 1, 2nd Ed., Informa Healthcare Inc., USA 7. Qiu, Y., Chen, Y., & Zang, G.G. (Eds.), 2009, Developing Solid Oral Dosage Form: Pharmaceutical Theory and Practice, 1st Ed., Elsevier. 8. Swarbrick, J. (Ed.), 2007, Encyclopedia of Pharmaceutical Technology 3rd, Informa Healthcare Inc Additional: 9. USP, 2022. United Stated Pharmacopoeia 42-National, Formulary 44. The United States Pharmacopeial Convention, Rockville, Maryland, USA.Depkes RI., 2020, Farmakope Indonesia, Ed. VI Note: Including the reference from integration Research form and or PKM to subject

Date of last amendment : 8 August 2022

Module 27: Analytical Chemistry II

Analytical Chemistry II (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221306/Compulsary
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	apt. Eka Noviana, Ph.D (Coordinator) Prof. Dr. Abdul Rohman, Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Flipped classroom, team-based learning, case-based learning 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	Analytical Chemistry
Course Learning Outcomes (CLO)	:	1. Understand methods of qualitative (identification) and quantitative analysis of drugs and their degradation products using instrumental analytical chemistry methods (spectrophotometry, spectroscopy and spectrometry). 2. Critically examine references involving instrumental analytical chemistry methods (spectroscopy and spectrometry) and apply knowledge to solve problems/cases related to pharmaceutical analysis.

Description	:	This course deals with the interaction between electromagnetic radiation (REM) and matter. Various spectrophotometric theories and techniques will be discussed, including UV-vis spectrophotometry, spectrofluorometry, atomic absorption spectrophotometry, atomic emission spectrophotometry with plasma light sources, infrared spectrophotometry, Raman spectrophotometry, NMR spectroscopy and mass spectrometry.
Examination Format/Assessment Methods	:	Project Result/Case Study Result/PBL Result 50%, Mid-term exam 25%, Final exam 25%
Learning Media	:	SCL: Flipped classroom, team-based learning, case-based learning
Literature	:	Main: 1. Pescok, R.L., Shields, L.D., Cairns, T., and McWilliam, I.G., 1976, Modern Methods of Chemical Analysis, 2ndnd Ed., John Wiley & Sons, New York. 2. Moffat, A.C., Osselton, M.D., and Widdop, B., 2011, Clarke's Analysis of Drugs and poisons in Pharmaceuticals, body fluids and post-mortem material, Fourth Edition, Pharmaceutical Press, London. 3. Kar, A, 2005, Pharmaceutical Drug Analysis, Age Int. Limited Publisher, New Delhi 4. Watson, D.G., 2012, Pharmaceutical Analysis, A Textbook for Pharmacy Students and Pharmaceutical Chemists, Third Edition, Churchill, Livingstone, Elsevier, London. 5. Svanberg, S. 2004. Atomic and Molecular Spectroscopy: Basic Aspects and Practical Applications. Springer. 6. Pavia D.L., Lampman, G.M., Kriz, G.S., 2008, Introduction to Spectroscopy, 3rd Ed, Thompson Learning, Londo 7. Skoog, D. A., Holler, F. J., & Crouch, S. R., 2007. Principles of Instrumental Analysis. Cengage learning. 8. Gross, J. H. 2006. Mass Spectrometry: A textbook. Springer Science & Business Media. 9. McLafferty F.W., 1980, Interpretation of Mass Spectra, Mill Valey, University Science Books, California 10. Robinson, J.W., Skelly Frame, E.M., Frame II, G.M., 2005, Undergraduate Instrumental Analysis, 6th Ed, Marcel Dekker, New York.
Date of last amendment	:	August 8th, 2022

Module 28: Medicinal Chemistry

Medicinal Chemistry (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221309/Compulsory
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	Dr. Sci. apt. Rohmad Yudi Utomo, M.Sc. Dr. apt. Hilda Ismail, M.Si. Dr. Bambang Sulistyo Ari Sudarmanto, M.Si. Dr. apt. Hari Purnomo, M.S. Dr. Cintya Nurul Apsari, M.Si. apt. Navista Sri Octa Ujiantari, M.Sc., Ph.D.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	https://elok.ugm.ac.id/course/view.php?id=12617 Offline: 70%; Daring: 30% 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	Organic Chemistry II, Pharmaceutical Biochemistry

Course Learning Outcomes (CLO)	:	1. Students are able to understand the scope and development of the latest medicinal chemistry, especially regarding the process of drug discovery and development, including receptor theory and drug metabolism. 2. Students are able to explain the relationship between structure and activity of drugs in the nervous system (analgesics, hypnotics-sedatives, antipsychotics, antidepressants, hallucinogens, stimulants). 3. Students are able to explain the relationship between structure and activity of drugs in the endocrine/hormonal system (steroids, non-steroids) and vitamins. 4. Students are able to explain the relationship between structure and activity of drugs in the endocrine/hormonal system (steroids, non-steroids) and vitamins. 5. Students are able to explain the relationship between structure and activity of drugs in the renal and cardiovascular systems (antihypertensive, cardiac agents, diuretics, antihyperlipidemia, antithrombotic / antiplatelet).
Description	:	Students are able to explain the relationship between structure and activity of drugs in the renal and cardiovascular systems (antihypertensive, cardiac agents, diuretics, antihyperlipidemia/antithrombotic/antiplatelet).
Examination Format/Assessment Methods	:	Project Result 50%, Mid-term exam 25%, Final exam 25%
Learning Media	:	https://elok.ugm.ac.id/course/view.php?id=12617 Offline: 70%; Online: 30%
Literature	:	1. Lemke, T. L., Williams, D. A., Roche, V.F., and Zito, S. W., 2013, FOYE'S Principles of Medicinal Chemistry, 7th Edition, USA, Lippincot Williams and Wilkins. 2. Nogrady, T, & Weaver, D.F., 2005, Medicinal Chemistry, A Molecular and Biochemical Approach, Oxford, London. 3. Abraham, D (Ed.), 2003, Burger's Medicinal Chemistry and Drug Discovery, 6th Edition, Volumes 1-6, Wiley Interscience. 4. Beale, J.M. & Block, J.H. (Ed.), 2011, Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th Edition, Lippincott Co., Toronto. 5. Related scientific articles from reputed journals Note: Including reference sources from forms of integration of Research and/or PkM into courses

Module 29: Research Methodology and Pharmaceutical Statistic

Research Methodology and Pharmaceutical Statistic (3 Credits/4.8 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221310/Compulsory
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	Dr. apt. Hilda Ismail, M.Si. Dr. apt.Purwanto, M.Sc., apt. (Koord) apt. Farida Nur Aziza, MGMP Prof. Dr. apt. Tri Murti Andayani, Sp.FRS
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Project-based learning 150 minutes per week for 14 weeks in one semester
Workload	:	150 minutes of in-class lectures 180 minutes of structured assignment activities 180 minutes of independent activities In total 510 minutes/week In 16 weeks = 8160 minutes = 136 hours 1 ECTS = 28 hours
Credits	:	(3 Credits/4.8 ECTS)
Prerequisites	:	
Course Learning Outcomes (CLO)	:	1. Understand the definition of science and research within the scope of pharmacy, the concept of research, science and scientific ethics. 2. Understand the structure of a research proposal and how to prepare it by considering the validity and reliability of the research 3. Understand the research design, sampling, and data collection method 4. Understand various statistical tests and determine the appropriate statistical test

Description	:	The Research Methodology course studies matters related to research methods and research design. The material consists of the definition of science, ethics of science and the scope of pharmaceutical science, the concept of research, logic of thought, validity and reliability of research, research design, preparation of research proposals and reports, as well as plagiarism, Sample size and sampling methods, data and basic statistics, parametric data analysis, non-parametric data analysis, and application of statistics in pharmacy
Examination Format/Assessment Methods	:	Project based 20%, Mid-exam 40%, Final Exam 40%
Learning Media	:	eLok https://elok.ugm.ac.id/
Literature	:	1. Anonim, 2013, Buku Petunjuk Skripsi Fakultas Farmasi Universitas Gadjah Mada,Panitia Skripsi Farmasi Universitas Gadjah Mada 2. Brown, T.R. and Smith, m.C., 1986, Handbook Of Institutional Pharmacy Practice 2nd Ed., Williams & Wilkins, Balitimore 3. Gibaldi, J., 1999, MLA Handbook For Writers Of Research Papers., 5th Ed., The Modern Languange Association Of America New York 4. Mulyadi, 2001, Skripsi I (Metodologi Penelitian) Bagian Sampel, Data, Analisis Data, Dan Penyusunan Laporan Penelitian, Buku Ajar Fakultas Farmasi UGM 5. Nelson, A.A., 1980, Research Methods For Pharmaceutical Practice, Am., J. Hosp.Pharm., 37,107-110 6. Pratiknya, A.W., 2003., Dasar-Dasar Metodologi Penelitian Kedokteran Dan Kesehatan, PT. Raja Grafindo Persada, Jakarta. 7. Schefler, W.C., 1979, Statistika Untuk Biologi, Farmasi, Kedokteran, Dan Ilmu Yang Bertautan, Edisi Terjemahan : Suroso, Penerbit ITB, Bandung.
Date of last amendment	:	August 8th, 2022

Module 40: Solid Dosage Form Formulation and Technology Practical work[AH3]

Solid Dosage Form Formulation and Technology Practical work (1 Credit/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221305/Compulsory
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	Prof. Dr. apt. T.N. Saifullah, M.Si. (Koordinator) Dr. Ronny Martien, M.Si. Dr.Eng. apt. Khadijah, M.Si. Farida Nur Aziza, MGMP., Apt,
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Case-Based Learning (CBL) 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	(1 Credit/1.6 ECTS)
Prerequisites	:	Pharmaceutic, Physical Pharmacy
Course Learning Outcomes (CLO)	:	1. Able to apply science and technology pharmacy latest in design, manufacture, guarantee quality, and distribution preparation pharmacy administration to test animals and analyze their effects on drug absorption. 2. Student capable make a solid dosage form with notice guarantee 3. Student capable evaluate the quality of formula
Description	:	Formulation and Technology Solid Preparations discuss about: tablet preparations, types and methods its use; tablet properties and their evaluation, tablet formulation, methods manufacture of tablets and equipment, internal problems tablets, sugar coated tablets, thin coated tablets, coating (granule, particle, compression), other types of tablets (coated, *effervescent*, sublingual, buccal, suction, *fast dissolving tablet* (FDT)), formulation capsules (hard, soft), equipment charging capsule.
Examination Format/Assessment Methods	:	Pretest 15%, Work 30%, Report Practice 20%, Response test 35%
Learning Media	:	https://elok.ugm.ac.id Offline: 100%; Online: 0%

Literature : Main:

1. Gonnissen Y, Remon JP, Vervaet C. Effect of maltodextrin and superdisintegrant in directly compressible powder mixtures prepared via co-spray drying. Eur J Pharm Biopharm. 2008;68(2):277–82.
2. Breitenbach J. Melt extrusion: from process to drug delivery technology. Eur J Pharm Biopharm. 2002;54(2):107–17.
3. Wang J, Wen H, Desai D. Lubrication in tablet formulations. Eur J Pharm Biopharm [Internet]. 2010;75(1):1–15. Available from: http://dx.doi.org/10.1016/j.ejpb.2010.01.007
4. Laili N, Komala AM, Maulida H. Optimasi Konsentrasi Amylum Sagu (Metroxylon rumphii) sebagai Co-Processed pada Pembuatan Tablet Teofilin Optimization of Sago Amylum Concentration (Metroxylon rumphii) as Co-Processed in Theophylline Tablets Sediaan tablet mengandung komponen eksipie. 2017;14(2):72–80.
5. Augsburger, L.L. & Hoag, S.W., 2008, Pharmaceutical Dosage Form: Tablets, 3rd Ed., Vol. I: Unit Operations and Mechanical Properties, Informa Healthcare, New York.
6. Banker, G.S. & Rhodes, C.T., 2002, Modern Pharmaceutics, 4th Ed., Marcel Dekker Inc., New York.
7. Niazi, K.S., 2009, Handbook of Pharmaceutical Manufacturing Formulations Compressed Solid Product, Vol. 1, 2nd Ed., Informa Healthcare Inc., USA
8. Qiu, Y., Chen, Y., & Zang, G.G. (Eds.), 2009, Developing Solid Oral Dosage Form: Pharmaceutical Theory and Practice, 1st Ed., Elsevier.
9. Swarbrick, J. (Ed.), 2007, Encyclopedia of Pharmaceutical Technology 3rd, Informa Healthcare Inc

Additional:

10. USP, 2022. United Stated Pharmacopoeia 42-National, Formulary 44. The United States Pharmacopeial Convention, Rockville, Maryland, USA.
11. Depkes RI., 2020, Farmakope Indonesia, Ed. VI

Note: Including the reference from integration Research form and or PKM to subject

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Date of last amendment : August 8th, 2022

Module 41: Analytical Chemistry II Practical work

Analytical Chemistry II Practical work (1 Credit/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221307/Compulsary
Level	:	Undergraduate
Semester	:	III
Course Coordinator/Lecturer	:	apt. Eka Noviana, M.Sc., Ph.D. (coordinator) Dr. rer. nat. apt. Siti Nurul Hidayah, M.Sc. apt. Halida Rahmania, M.Agr.Sc., Ph.D. Dr. apt. Agustina Ari Murti Budi Hastuti, M.Sc. Dr. Artania Adnin Tri Suma, S.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Lab activity, discussion, evaluation based on objective structured clinical examination (OSCE) 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	(1 Credit/1.6 ECTS)
Prerequisites	:	Analytical Chemistry I
Course Learning Outcomes (CLO)	:	1. understand the ways of qualitative (identification) and quantitative analysis of drugs and their degradation products using instrumental analytical chemistry methods (spectrophotometry, spectroscopy and spectrometry) 2. apply instrumental analytical chemistry methods (spectroscopy and spectrometry) to evaluate the quality and quality assurance of pharmaceutical preparations and apply chemical concepts to the discovery and development of medicinal raw materials and drugs.
Description	:	This lab course supports the Analytical Chemistry II course (FAF221306) which discusses the application of instrumental analytical chemistry methods for pharmaceutical analysis. Analytical Chemistry II lab activities include: quantitative analysis of drugs using UV/vis spectrophotometry and spectrofluorometry and qualitative analysis using IR spectroscopy and mass spectrometry.
Examination Format/Assessment Methods	:	Pretest 15%, Lab work 15%, Lab report 30%, OSCE-like exam 40%

Learning Media	:	http://ugm.id/eLOK2022KA2, Offline: 100%; Online: 0%
Literature	:	Main: 1. Pescok, R.L., Shields, L.D., Cairns, T., and McWilliam, I.G., 1976, Modern Methods of Chemical Analysis, 2ndnd Ed., John Wiley & Sons, New York. 2. Moffat, A.C., Osselton, M.D., and Widdop, B., 2011, Clarke's Analysis of Drugs and poisons in Pharmaceuticals, body fluids and post-mortem material, Fourth Edition, Pharmaceutical Press, London. 3. Kar, A, 2005, Pharmaceutical Drug Analysis, Age Int. Limited Publisher, New Delhi 4. Watson, D.G., 2012, Pharmaceutical Analysis, A Textbook for Pharmacy Students and Pharmaceutical Chemists, Third Edition, Churchill, Livingstone, Elsevier, London. 5. Pavia D.L., Lampman, G.M., Kriz, G.S., 2008, Introduction to Spectroscopy, 3rd Ed, Thompson Learning, London 6. Silverstein 7. Petunjuk praktikum Kimia Analisis II, 2023, Laboratorium Kimia Analisis, Fakultas Farmasi UGM Additional (integration): - Note: Including reference sources for integration of research and/or community service into courses
Date of last amendment	:	August 8th, 2022

Module 42: Clinical PharmacokineticsTherapeutic Drug Monitoring

Clinical PharmacokineticsTherapeutic Drug Monitoring (2 Credits/3.2 ECTS)		
Advanced Pharmacy Practice		
Code/Status	:	FAF 221401/Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	Dr. apt. Purwantiningsih, M.Si. apt. Arief Rahman Hakim, M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions on a problem 3. Case-based learning, students will be given a case, then asked to work on the case (according to the presentation in the lecture) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacocinetic
Course Learning Outcomes (CLO)	:	1. Students are able to explain the definition and benefits of clinical pharmacokinetics/TDM, and factors that can affect the results of therapy, namely drug factors, internal factors, and external factors, and are able to determine drug dosage regimens after administering drugs via continuous intravenous infusion, repeated intravenous infusion, repeated bolus intravenous injection, repeated oral administration. 2. Students are able to determine creatinine clearance estimates and dosage regimens in patients with decreased kidney and liver function, special drug dosage regimens and TDM (digoxin, theophylline, aminoglycosides, cyclosporine).

Description	:	The course of Clinical Pharmacokinetics/TDM is the application of pharmacokinetics in the clinic to design dosage regimens for individual patients. Drug dosage regimens include continuous intravenous infusion, repeated intravenous infusion, repeated bolus intravenous injection, and repeated oral administration. Estimation of creatinine clearance and drug dosage regimens in patients with decreased kidney and liver function, special drug dosage regimens (digoxin, theophylline, and aminoglycosides, cyclosporine), and monitoring of drug levels in the blood (therapeutic drug monitoring, TDM) are carried out in pathological conditions, drug interactions.
Examination Format/Assessment Methods	:	10% Participative, 20% Quiz, 35% midterm exam, 35% final exam.
Learning Media	:	https://elok.ugm.ac.id Offline: 85%; Online: 15%
Literature	:	Main: 1. Winter ME, 2009, Farmakokinetika Klinik Dasar, edisi ke-5, Penerbit Buku Kedokteran EGC, Jakarta 2. Hakim, L., 2016, Farmakokinetika Klinik, Edisi 1, Bursa Ilmu Yogyakarta 3. Shargel, L. dan Yu, A.B.C., 2016, Applied Biopharmaceutics and Pharmacokinetics, 7th ed., McGraw- Hill Education, New York The additional Ref : 4. Bauer LA (2008) Applied Clinical Pharmacokinetics. McGraw-Hill, NewYork 5. Dasgupta A (2008) Introduction to Therapeutic Drug Monitoring. Dalam Dasgupta A (ed) Handbook of Drug Monitoring Methods -Therapeutics and Drugs of Abuse. Humana Press, Totowa NJ

Date of last amendment: 8 August 2022

Module 43: Experimental Pharmacology and Toxicology II[AH4]

Experimental Pharmacology and Toxicology II (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221402/Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	Prof. Dr. apt. Sugiyanto, SU. Prof. Dr. apt. Agung Endro Nugroho, M.Si. Dr. apt. Ika Puspita Sari, M.Si. Dr. apt. Purwantiningsih, M.Si. apt. Arief Rahman Hakim, M.Si. Dr. apt. Arief Nurrochmad, M.Sc. drh. Retno Murwanti, M.P., Ph.D. Dr. apt. Nunung Yuniarti, M.Si. Dr. apt. Dyaningtyas Dewi P.P., M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Case-based Learning[AH5] 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	(1 Credits/1.6 ECTS)
Prerequisites	:	Pharmacology II, Toxicology
Course Learning Outcomes (CLO)	:	1. Students are able to determine the pharmacokinetic parameters of drugs after a single dose using blood and urine data. 2. Students are able to analyze data from experiments with laboratory animals to see the effects of drugs that can lower blood pressure in vivo using the non-Invasive Blood Pressure System method and evaluate the efficacy of a hypertension drug, as well as understand research designs for antihypertensive trials. 3. Students are able to analyze data from experiments with laboratory animals to see the effects of drugs that can lower blood pressure in vivo using the non-Invasive Blood Pressure System method and evaluate the efficacy of a hypertension

		drug, as well as understand research designs for antihypertensive trials. 4. Students can recognize, practice and carry out experiments involving histamine receptors and are able to determine the pD2 value of antihistamines using isolated guinea pig tracheal organ pharmacology tests, prepare guinea pig tracheal organs, set up tools, add agonists to isolated organs, observe the process and collect data on tracheal smooth muscle contractions. 5. Students are able to understand and carry out in vitro drug metabolism tests.
Description	:	Experimental Pharmacology and Toxicology II Practicum contains the practice of determining pharmacokinetic parameters of drugs after a single dose based on drug levels in blood and urine, antihypertensive tests, teratogenic tests, receptors as targets of drug action (histamine receptors) and drug metabolism. The learning method is carried out with practicums that are directly followed by questions and answers and discussions so that students understand each sub-topic given. While the assessment method is based on the value of interim reports, pretests, activities (discussions), official reports, and responses.
Examination Format/Assessment Methods	:	Presence 10%, interim report 10%, Pretest 10%, Activity 20%, Final report 20%, post-test 10%, Response test 20%
Learning Media	:	Offline learning utilizing eLOK as LMS. 25% online learning with zoom platform
Literature	:	1. Laurence, D.R dan Bacharach, A.L.,1964, Evaluation of Drug Activities,Pharmacometrics. 2. Smith, J.B. dan Soesanto Mangkoewidjojo, 1988, Pemeliharaan, Pembiakan, dan Penggunaan Hewan Percobaan di Daerah Tropis, Universitas Indonesia Press, Jakarta 3. Domer, F.R., 1971, Animal Experiment in Pharmacological Analysis, 1st Edition, Charles C. Thomas Publiser, Illinois. 4. ILAR, 1996, Guide for the Care and Use of Laboratory Animals, National Academic Press, Washington DC. 5. Shargel L. & Yu A.B.C., 2016, Applied Biopharmaceutics and Pharmacokinetics, 7th Ed., Mc Graw Hill Education, New York 6. Ritchel, W.A., 1980, Handbook of Basic Pharmacokinetics, 2 nd ed., Drug Intell.Publ. Inc., Hamilton.

7. Imono Argo Donatus, 1985, Strategi Penelitian Farmakokinetika. Cermin Dunia Kedokteran, No.37 Turner, (1967) Methods in Experimental Pharmacology
8. Rang, H.P., Dale, M.M., Ritter, J.M. & Flower, R.J. (2007) Pharmacology, 5th edn, Churchill Livingstone, Edinburgh
9. Neal, M.J. (2009) Medical Pharmacology at a Glance, 6th edition, Wiley-Blackwell a John Wiley & Sons, Ltd. Publication, West Sussex
10. World Health Organization (WHO), 1967, Principles for the testing of drugs for teratogenicity, WHO Technical Reports Series No. 364, WHO, Geneva
11. Burkhalter, A., Julius, D. dan Frick, O.L., 1994, Histamin, Serotonin and Ergot Alkaloid, In Basic and Clinical Pharmacology, 6th Ed., A Publishing Division of Prentice Hall. San Franscisco.
12. Tallarida, R.J., and Jacob, L.S., 1979, The Dose Response Relation in Pharmacology, Springer-Verlag, Berlin.
13. Sugiyanto, Arief RH, Dyaningtyas DPP, Djoko W, Ika P, Purwantiningsih, Arief N, Retno M, Nunung Y, Agung EN, Panji P, Miranda P, Buku Petunjuk Praktikum Farmakologi & Toksikologi Eksperimental II 2020, 8th Edition Yogyakarta

Date of last amendment : August 8th, 2022

Module 44: Pharmacotherapy I

Pharmacotherapy I (2 Credits/3.2 ECTS)		
Advanced Pharmacy Practice		
Code/Status	:	FAF 221403/Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	Dr. apt. Fita Rahmawati, Sp.FRS. (Coord)) Prof. Dr. apt. Tri Murti Andayani, Sp.FRS. Prof. Dr.apt. Zullies Ikawati, M.Sc. Dr. apt. Nanang Munif Yasin, M. Pharm apt. Firdhani Satya Primasari, M.Clin.Pharm apt. Maya Ramadhani Indarto, M.Clin.Pharm
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given a task to be completed together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course. 4. Case-based learning / PBL / other SCL methods, students will be given real problems in society, then asked to identify the root of the problem and try to find a way out (according to the presentation in the lecture) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacocinetic
Course Learning Outcomes (CLO)	:	1. Understand the principles of rational pharmacotherapy, identification of drug-related problems (DRP) and literature search for evidence-based medicine (EBM) 2. Understanding pathophysiology, pharmacotherapy, monitoring effectiveness and side effects of drugs, as well as providing information and education to patients with pain and rheumatological disorders 3. Understanding pathophysiology, pharmacotherapy, monitoring effectiveness and side effects of drugs, as well as providing information and education on endocrine disorders

		4. Understanding pathophysiology, pharmacotherapy, monitoring effectiveness and side effects of drugs, as well as providing information and education on cardiovascular disorders
Description	:	This course studies rational pharmacotherapy and therapy monitoring, drug-related problems (DRPs), evidence-based medicine (EBM), pharmacotherapy of pain and headache, osteoarthritis and rheumatoid arthritis, osteoporosis, diabetes mellitus, thyroid disorders, menstrual disorders, hypertension, dyslipidemia, ischemic heart disease (IHD), acute coronary syndrome (ACS), and ischemic stroke.
Examination Format/Assessment Methods	:	10% Participatory 20% project result 50%, midterm exam 20% final exam.
Learning Media	:	https://elok.ugm.ac.id Offline: 70%; Online: 30%
Literature	:	Main: 1. Dipiro, J.T., et al. 2011, Pharmacotherapy: A Pathophysiologic Approach, 8th Ed, McGraw-Hill, New York. 2. Kementerian Kesehatan Republik Indonesia, 2011, Modul Penggunaan Obat Rasional, Jakarta Kementerian Kesehatan Republik Indonesia. Additional : 3. Alldredge, B.K., et al., 2013, Koda-Kimble & Young's Applied Therapeutics: The Clinical Use of Drugs, 10th Ed, Lippincott Williams & Wilkins, Philadelphia. 4. Brunton, L.L., et al. 2012, Goodman & Gilman's The Pharmacological basic of therapeutic, 12th Ed, McGraw-Hill, New York. 5. Helms, R.A., et al. 2006, Textbook of Therapeutics, Drug and Disease Management, 8th Ed., Lippincot & Williams, Philadelphia. 6. Holloway, K. & van Djik, L., 2011, The World Medicines Situation 2011: Rational Use of Medicines, Geneva: World Health Organization. 7. Scwinghammer, T.L. & Koehler, J.M., 2009, Pharmacotherapy Casebook: A Patient Focused Approach, 7th Ed., McGraw-Hill, New York. 8. Widayani, S. S., Rahmawati, F., & Yasin, N. M. (2021). Perbandingan Efektivitas Penggunaan Nifedipin Dengan Metildopa Dalam Mengontrol Tekanan Darah Pasien Preeklamsia. Majalah Farmaseutik, 18(3), 247-253.

Date of last amendment: 8 August 2022

Module 45: Semisolid-liquid Dosage Form Formulation and Technology

Semisolid-liquid Dosage Form Formulation and Technology (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF221404/Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	Dr. T.N. Saifullah, Apt. Dr.Eng., Khadijah, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Physical Pharmacy
Course Learning Outcomes (CLO)	:	1. Students are able to design, formulate, and make liquid and semi-solid preparations (emulsions, syrups, elixirs, suspensions, ointments, creams and suppositories) 2. Students are able to evaluate and control the quality and stability of liquid and semi-solid preparations (emulsions, syrups, elixirs, suspensions, ointments, creams and suppositories)
Description	:	The course on formulation and technology of liquid-semisolid preparations contains materials on: introduction, ternary diagrams, emulsions, emulsifiers (surfactant groups, hydrocolloids and dispersed solids), making emulsions, suspensions, syrups and elixirs, ointments, creams, making and packaging, design protocols for the development and testing of ointments and suppositories. The entire course material on formulation and technology of liquid-semisolid preparations is divided into 8 topics given in 14 face-to-face meetings.
Examination Format/Assessment Methods	:	Quiz 2.5%, essay 7.5%, midterm exam 45%, final exam 45%

Learning Media	:	-
Literature	:	Main: 1. Ansel, H.C., Popovich, N.G., & Allen Jr., L.V., 2005, Pharmaceutical Dosage Forms and Drug Delivery System, William & Wilkins, Parkway PA. 2. Aulton, M.E. (Ed.), 2002, Pharmaceutic The Science of Dosage Form Design, 2nd, ELBS, Hongkong. 3. Kulshreshtha, A.K., Singh, O.N., & Wall, G.M. (Eds.), 2010, Pharmaceutical Suspensions: From Formulation Development to Manufacturing, Springer, New York. 4. Nielloud, F. & Marti-Mestres, G. (Eds.), 2000, Pharmaceutical Emulsions and Suspensions, Marcel Dekker Inc., New York. Tambahan : Niazi, K.S., 2009, Handbook of Pharmaceutical Manufacturing Formulations Semisolid Products, Vol. 4, 2nd Ed., Informa Healthcare Inc.

Date of last amendment: 8 August 2022

Module 46: Chromatography

Chromatography (2 Credits/3.2 ECTS)		
Advanced Pharmacy Practice		
Code/Status	:	FAF221406/Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	apt. Eka Noviana, Ph.D. (Coordinator) Prof. Dr. apt. Abdul Rohman Prof. Dr.rer.nat apt. R.R. Endang Lukitaningsih. Dr.rer.nat. apt. Tatang Irianti., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Flipped classroom (coursework), team-based and case-based learning learning (group project) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Physical Pharmacy
Course Learning Outcomes (CLO)	:	1. Students are able to design, formulate, and make liquid and semi-solid preparations (emulsions, syrups, elixirs, suspensions, ointments, creams and suppositories) 2. Students are able to evaluate and control the quality and stability of liquid and semi-solid preparations (emulsions, syrups, elixirs, suspensions, ointments, creams and suppositories)
Description	:	The course on formulation and technology of liquid-semisolid preparations contains materials on: introduction, ternary diagrams, emulsions, emulsifiers (surfactant groups, hydrocolloids and dispersed solids), making emulsions, suspensions, syrups and elixirs, ointments, creams, making and packaging, design protocols for the development and testing of ointments and suppositories. The entire course material on formulation and technology of liquid-semisolid preparations is divided into 8 topics given in 14 face-to-face meetings.
Examination Format/Assessment Methods	:	Quiz 2.5%, essay 7.5%, midterm exam 45%, final exam 45%
Learning Media	:	-
Literature	:	Main:

1. Ansel, H.C., Popovich, N.G., & Allen Jr., L.V., 2005, Pharmaceutical Dosage Forms and Drug Delivery System, William & Wilkins, Parkway PA.
2. Aulton, M.E. (Ed.), 2002, Pharmaceutic The Science of Dosage Form Design, 2nd, ELBS, Hongkong.
3. Kulshreshtha, A.K., Singh, O.N., & Wall, G.M. (Eds.), 2010, Pharmaceutical Suspensions: From Formulation Development to Manufacturing, Springer, New York.
4. Nielloud, F. & Marti-Mestres, G. (Eds.), 2000, Pharmaceutical Emulsions and Suspensions, Marcel Dekker Inc., New York.

Tambahan :

Niazi, K.S., 2009, Handbook of Pharmaceutical Manufacturing Formulations Semisolid Products, Vol. 4, 2nd Ed., Informa Healthcare Inc.

Date of last amendment: 8 August 2022

Module 47: Semisolid-liquid Dosage Form Formulation and Technology Practical Work

Semisolid-liquid Dosage Form Formulation and Technology Practical Work (2 Credits/3.2 ECTS)		
Advanced Pharmacy Practice		
Code/Status	:	FAF221405 /Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	Dr. T.N. Saifullah, Apt. Dr.Eng., Khadijah, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes in the laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Physical Pharmacy
Course Learning Outcomes (CLO)	:	1. Students are able to design, formulate, and make liquid and semi-solid preparations (emulsions, syrups, elixirs, suspensions, ointments, creams and suppositories) 2. Students are able to evaluate and control the quality and stability of liquid and semi-solid preparations (emulsions, syrups, elixirs, suspensions, ointments, creams and suppositories)
Description	:	The course on formulation and technology of liquid-semisolid preparations contains materials on: introduction, ternary diagrams, emulsions, emulsifiers (surfactant groups, hydrocolloids and dispersed solids), making emulsions, suspensions, syrups and elixirs, ointments, creams, making and packaging, design protocols for the development and testing of ointments and suppositories. The entire course material on formulation and technology of liquid-semisolid preparations is divided into 8 topics given in 14 face-to-face meetings.
Examination Format/Assessment Methods	:	Quiz 2.5%, essay 7.5%, midterm exam 45%, final exam 45%
Learning Media	:	Elok
Literature	:	Main: 1. Ansel, H.C., Popovich, N.G., & Allen Jr., L.V., 2005, Pharmaceutical Dosage Forms and Drug Delivery System, William & Wilkins, Parkway PA. 2. Aulton, M.E. (Ed.), 2002, Pharmaceutic The Science of Dosage Form Design, 2nd, ELBS, Hongkong.

3. Kulshreshtha, A.K., Singh, O.N., & Wall, G.M. (Eds.), 2010, Pharmaceutical Suspensions: From Formulation Development to Manufacturing, Springer, New York.
4. Nielloud, F. & Marti-Mestres, G. (Eds.), 2000, Pharmaceutical Emulsions and Suspensions, Marcel Dekker Inc., New York.

Tambahan :

Niazi, K.S., 2009, Handbook of Pharmaceutical Manufacturing Formulations Semisolid Products, Vol. 4, 2nd Ed., Informa Healthcare Inc.

Date of last amendment: 8 August 2022

Module 48: Chromatography Practical Work

Chromatography Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221307/Compulsary
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	apt. Eka Noviana, S.Farm., M.Sc., Ph.D. Dr. apt. Agustina Ari Murti Budi Hastuti, M.Sc. apt. Halida Rahmania, S.Farm., M.Agr.Sc., Ph.D. Dr. Cintya Nurul Apsari, S.T.P., M.Si. Dr. rer. nat. apt. Siti Nurul Hidayah, M.Sc. (Coordinator)
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Team-based Project consists of oral pre-test and discussion, practicum, objective structured clinical examination (OSCE) based evaluation (dry-lab). 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	(1 Credits/1.6 ECTS)
Prerequisites	:	Analytical Chemistry II
Course Learning Outcomes (CLO)	:	1. understand the ways of separation, identification, and quantification using chromatographic methods 2. apply chromatographic methods for identification and quantification of drugs, drug raw materials and chemicals 3. able to process analytical data from the results of chromatographic methods
Description	:	This practicum supports the chromatography course (FAF 221406). In this practicum, lab work is carried out which includes the application of chromatographic methods for qualitative analysis (identification) and quantitative analysis related to quality assurance of drugs and medicinal materials. Methods performed in the lab include thin layer chromatography (TLC), column chromatography (CC), gas chromatography (GC), and high-performance liquid chromatography (HPLC).
Examination Format/Assessment Methods	:	Pre-lab test 10%, oral pretest and discussion 30%, Lab work 10%, Lab report 25%, OSCE-like exam 25%
Learning Media	:	http://ugm.id/eLOK2022KA2, Offline: 100%; Online: 0%

Literature : Main:

1. Gritter, R.J., Bobbitt, J.M., Schwarting, A. E., 1985, Introduction to Chromatography, Holden-Day INC, Oakland, USA.
2. Sherman, J., Bernard, F., 1996, Handbook of Thin-Layer Chromatography, Second ed., Marcel Dekker INC, New York
3. Snyder, L.R. and Krikland, J.J. 1999, Introduction to Modern Chromatography, 2nd Edition, Awiley-Interscience publikation, United State of America
4. Neue, U.D.,1997, HPLC Columns. Theory Technology and Practice, John Wiley & Sons INC, New York.
5. Budiraja, R.P.,2004, Separation Chemistry, New Age International (P) Limited Publisher, New Delhi, India.
6. Watson, D.G., 1999, Pharmaceutical Analysis: A textbook for pharmacy students and pharmaceutical chemists, Churchill Livingston, UK.
7. Clarke, E.G.C., 1971, Isolation and Identification of Drugs, in pharmaceuticals, body fluid and post-mortem material, The Pharmaceutical Press, London
8. Skoog, D. A., Holler, F. J., & Crouch, S. R., 2007. Principles of Instrumental Analysis. Cengage learning
9. Giddings, J.C., 1991. Unified Separation Science, John Wiley & Sons, Inc.

Additional:

P1 (TLC):

1. Rohman, A., Wijayanti, T., Windarsih, A., & Riyanto, S. (2020). The authentication of Java turmeric (Curcuma xanthorrhiza) using thin layer chromatography and 1H-NMR based metabolite fingerprinting coupled with multivariate analysis. Molecules, 25(17), 3928.

P2 (CC):

1. Suma, A. A. T., Wahyuningsih, T. D., & Mustofa, M. (2019). Synthesis, Cytotoxicity Evaluation and Molecular Docking Study of N-Phenylpyrazoline Derivatives. Indonesian Journal of Chemistry. 19 (4), 1081-1090.

P3 (GC):

1. Putri, A. R., Aliaño-González, M. J., Ferreiro, M., Setyaningsih, W., Rohman, A., Riyanto, S., & Palma, M. (2020). Development of a methodology based on headspace-gas chromatography-ion mobility spectrometry for the rapid detection and determination of patin fish oil adulterated with palm oil. Arabian Journal of Chemistry, 13(10), 7524-7532.

P4 (HPLC):

1. Windarsih, A., Arifah, M. F., & Rohman, A. (2022). The Application of Untargeted Metabolomics Using UHPLC-HRMS and Chemometrics for Authentication of Horse Milk Adulterated with Cow Milk. Food Analytical Methods, 1-12.

2. Hidayah, S. N., Biabani, A., Gaikwad, M., Nissen, P., Voss, H., Riedner, M., Schlueter, H., Siebel, B. (2023). Aplication of Sample Displacement Batch Chromatography for Fractionation of Proteoform. Proteomics, 202200424, 1-12.

Date of last amendment : August 8th, 2022

Module 49: Product Stability

Product Stability (2 Credits/3.2 ECTS)		
Advanced Pharmacy Practice		
Code/Status	:	FAF221408/Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	Prof. Dr. Apt. TN Saifullah S., M. Si. (Coordinator) Prof. Dr. apt. Achmad Kharis Nugroho., M. Si. Prof. Dr. apt. Abdul Karim Z., M. Si. Apt. Farida Nur Aziza, MGMP.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	A combination of tutorials and activities Team Based Learning 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Physical Pharmacy II
Course Learning Outcomes (CLO)	:	1. Student capable identify preparation Expired / damaged/sub standard pharmaceuticals assess suitability and expiry limits 2. Student capable identify preparation Expired / damaged/sub standard pharmaceuticals assess suitability and expiry limits 3. Students are able to evaluate the quality of pharmaceutical preparations in order to determine product stability

Description	:	The product stability course contains material about: studies stability preparation drug, kinetics degradation drug, form change preparation during storage, effect packaging to stability, influence excipients to stability, method test stability And calculation age preparation, methods enhancement stability product, And regulations about test stability preparation.
Examination Format/Assessment Methods	:	Participatory activities 10%, Project result 40%, midterm exam 25%, final exam 25%
Learning Media	:	https://elok.ugm.ac.id Offline 60%; Online 40%
Literature	:	Main: 1. Anonymous, 2006, Stability Testing Of Active Substances And Pharmaceutical Products , World Health Organization. 2. Anonymous, 2013, Asean Guidelines On Stability Study & Shelf-Life 3. Huynh-Ba, K, (Ed.), 2009, Handbook of Stability Testing in Pharmaceutical Development: Regulations, Methodologies, and Best Practices, Springer. 4. Tønnesen, H. H., 2004, Photostability Of Drugs And Drug Formulations Second Edition, CRC Press. 5. Yoshioka, S. and Valentino, J. S., 2002, Stability of Drugs and Dosage Forms, Kluwer Academic Publishers. Tambahan : 1. USP, 2023. United Stated Pharmacopoeia 41-National, Formulary 36. The United States Pharmacopeial Convention, Rockville, Maryland, USA.

Date of last amendment: 8 August 2022

Module 50: Toxicology

Toxicology (2 Credits/3.2 ECTS)		
Advanced Pharmacy Practice		
Code/Status	:	FAF221409/Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	apt. Arief Nurrochmad, M.Si., M.Sc. Ph.D apt. Purwantiningsih, M.Si., Ph.D. drh. Retno Murwanti, MP., Ph.D. apt. Soni Siswanto, M.Biomed, D.Pharm.Sc
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Case-based and team-based project learning 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacology 1
Course Learning Outcomes (CLO)	:	1. Student can comprehend the history of toxicology, the definition, importance, and scope of toxicology, as well as the fate of pharmaceuticals in the body. They can also master the main fundamental concepts of toxicology, such

		as conditions, processes forms, and attributes of harmful effects. 2. Students can understand, describe, compare, and assess the elements that impact the toxicity of hazardous chemicals and the reaction of tissues to toxicity substances, as well as the body's response to toxic compound exposure and ist toxicity benchmark 3. Students can understand the definition and meaning of antidote therapy, explain, compare and determine therapeutics targets, therapeutic strategies and procedures for implementing toxic chemical antidote therapy 4. Student can understand and learn the concepts, definition and meaning of toxiclogical research/testing, formulate toxicological test protocol, incl. determination the validity of toxicological tests, safety assessment and risk assessment and justification of risk assessment
Description	:	Toxicology studies and discusses the definition and scope of toxicology, the fate of xenobiotics/toxic substances in the body, the general basic concepts of toxicology, which include various conditions of toxic effect, mechanism of action, form and nature of toxic effect, factors affecting toxicity, toxic responss to xenobiotics, biochemical & molecular mechanism if toxic effect, specific and un-specific toxicity testing, risk assessment, the basic for antidote therapy, and the basic for antidotes testing
Examination Format/Assessment Methods	:	cased-base project 50%, midterm 50%
Learning Media	:	Offline learning uses the LMS el-OK www.elok.ug.ac.id as a leuning tool Offline: 100 %
Literature	:	Main: 1. Loomis, T.A. 1994. Essentials of Toxicology. 3rd Ed. Lea & Febiger: Philadelphia. 2. Donatus, I.A. 2005, Toksikologi Dasar. Edisi Il. Bagian Famakologi dan Farmasi Klinik, Fakultas Fannasi UGM, Yogyakarta. 3. Haschek, W.M., Wallig, & Rousseaux, C., 2010, Fundamentals in Toxicologic Pathology, 2nd Ed., Academic Press, London. 4. Timbrell, J.A. 2009. Principles of Biochemical Toxicology. 4th Ed, Taylor & Francis, London Additional:

5. Sasongko, H., Nurrochmad, A. , Rohrnan. A., & Nugroho, A. E. (2022). Characteristic of Streptozotocin-Nicotinamide-lnduced Inflammation in A Rat Model of Diabetes-Associated Renal Injury. Open Access Macedonian Journal of Medical Sciences, 1008), 16-22. https:'/doi.or%/10.3**9/oamims2022.9460
6. Purwantiningsih, P., & Nurlaila (2016). EFFECT' OF THE REPEL LEAVES EXTRACT (STELECHOCARPUS BURAHOL [BL.J HOOK. F. & TH.) ON SPRAGUE-DAWLEY RATS: AN ACUTE TOXICITY STUDY. Asian Journal ofPharmaceutical and Clinical Research. 9, 325-328.
7. Murwanti R, Meiyanto E, Nurrochmad A, Kristina SA (2004). Efek ekstrak etanol rimpang temu putih (Curcuma zedoaria Rose.) terhadap pertumbuhan tumor paru fase post inisiasi pada mencit betina diinduksi Benzolalpiren. Majalah Farmasi Indonesia, 15(1), 7- 12
8. Siswanto, S and Wardhani, BWK. (2022) "Association ofEnvironmental Pollutants Exposure with Pulmonary Fibrosis: A Mini Review ofMolecular Mechanism Mediated,"Pharmaceutical Sciences and Research: Vol. 9: No. l, Article 2. DOI: 10.7454/psr.v9il.1243
9. Badan Pengawasan Obat dan Makanan (2022). Peraturan Badan Pengawas Obat dan Makanan no 10 Tahun 2022 tentang Pedoman Uji Toksisitas Praklinik secara In Vivo. BPOM. Jakarta.
10. Other related Journal

Date of last amendment: 8 August 2022

Module 90: Indonesian Language and Scientific Writing[AH12]

Indonesian Language and Scientific Writing (2 Credits/3.2 ECTS)
Advanced Pharmacy Practice

Code/Status	:	UNUIB 212201/Compulsary
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	UGM Indonesian Language Education Course Team
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Discussion, team work, individual task, presentation 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	

Course Learning Outcomes (CLO)	:	1. Knowledge, students are able to explain effective sentence models and explain the composition of scientific writing well. 2. Skill, students are able to using spelling and diction correctly, composing effective sentences, composing cohesive and communicative paragraphs, applying scientific writing techniques properly and correctly, planning essays according to the chosen topic. 3. Attitude, students are able to have high appreciation for Indonesian as a medium of scientific communication, have high loyalty, dedication, and tolerance both in working independently and in groups.
Description	:	This course is one of the compulsory courses that must be taken by students of Universitas Gadjah Mada. As a compulsory university course, this course provides knowledge and skills in using good and correct Indonesian in writing scientific papers. In addition, it also provides knowledge of research ethics and skills in avoiding plagiarism. In learning, lecture methods, discussions, case studies, problem solving, and practice will be utilized to achieve optimal results from learning objectives. Language practice using standard Indonesian, especially written varieties, will dominate assignments in lectures.
Examination Format/Assessment Methods	:	Task 20%, Participation 10%, paper 20%, midterm 20%, final-exam 30%
Learning Media	:	Offline: 100%
Literature	:	Main: 1. Akhadiah, Sabarti, Maidar G. Arsjad, dan Sakura H. Ridwan. 1992. *Pembinaan Kemampuan Menulis Bahasa Indonesia*. Jakarta: Erlangga. 2. Arifin, E. Zaenal dan S. Amran Tasai. 2000. *Cermat Berbahasa Indonesia untuk Perguruan Tinggi*. Cetakan ke-4. Jakarta: Akademika Pressindo. 3. Indonesian Language Guidelines Development Team. 2016. *Pedoman Umum Ejaan Bahasa Indonesia*. Jakarta: Badan Pengembangan dan Pembinaan Bahasa. 4. Wibowo, Ridha Mashudi. 2009. *Cermat Menulis dalam Bahasa Indonesia*. Cetakan ke-3. Yogyakarta: Fokusahaja Press. Additional: 5. Keraf, Gorys. 1981. *Diksi dan Gaya Bahasa*. Ende: Nusa Indah. 6. Rahardi, R. Kunjana. 2009. *Bahasa Indonesia untuk Perguruan Tinggi*. Jakarta: Erlangga.

7. Situmorang, B.P. 1986. *Bahasa Indonesia sebagai Bahan Kuliah Dasar untuk Perguruan Tinggi*. Cetakan ke-3. Ende: Nusa Indah.
8. Soedjarwo. 1994. *Beginilah Menggunakan Bahasa Indonesia*. Cetakan ke-2. Yogyakarta: Gadjah Mada University Press.
9. Wijana, I Dewa Putu. 2008. *Bahasa Indonesia untuk Penulisan Ilmiah*. Yogyakarta: Pustaka Araska.

Date of last amendment	August 8th, 2022

Module 92.a: Islamic Religion[AH13]

Religion[AH14] **(2 Credits/3.2 ECTS)**

Advanced Pharmacy Practice		
Code/Status	:	[AH15] /Compulsory
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	UGM Islamic Religion Course Team
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Contextual Teaching and Learning, Problem Based Learning, Cooperative Learning 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	-
Course Learning Outcomes (CLO)	:	Believing, understanding and explaining the truth of various aspects of Islamic teachings, integrating them into each discipline, and applying them in the form of daily personality and behavior.

Description	:	General Compulsory Course (MKWU) is a compulsory course that functions as a personality builder for islamic religion included believing, understanding and explaining the truth of various aspects of Islamic teachings, integrating them into each discipline, and applying them in the form of daily personality and behavior.
Examination Format/Assessment Methods	:	Presence 15%, midterm 20%, final-exam 25%, task 20%, Morals in behavior and dress 20%
Learning Media	:	Offline: 100%
Literature	:	1. Lecturer Team of PAI UGM, Pendidikan Islam , Yogyakarta : 2005 2. M. Quraish Shihab, Wawasan Al-Qur'an, Bandung: Mizan, 1996. 3. MPK PAI pada Perguruan Tinggi Umum, Dirjend Diktis Kemenag RI 2009 4. Isma'il Raji Al-Faruqi, Tauhid (terjemahan) Bandung: Pustaka, 1996. 5. Ajat Sudrajat, dkk Dienul-Islam Di PTU, Yogyakarta: UNY 2016.
Date of last amendment	:	August 8th, 2022

Module 91: Civic Education[AH16]

Civic Education (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	UNU 3000/Compulsary
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	UGM Civic Education Course Team
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Lecture, Dialogue, Discussion, Review, Social activity/action, 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours

1 ECTS = 28 hours

Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	
Course Learning Outcomes (CLO)	:	1. Understand the material well 2. Have awareness and responsibility as a good citizen 3. Be able to think critically in dealing with problems in society. 4. Provide creative solutions in solving national problems. 5. Do something as evidence of defending the country..
Description	:	Personality Development Course (MPK) or now called General Compulsory Course (MKWU) is a national compulsory course that functions as a personality builder for scientists or experts in the field. By taking this course, it is expected that the graduates produced will have added quality. The General Compulsory Courses (MKWU) include Religious Education, Pancasila, Citizenship and Indonesian, each with its own learning objectives. In the Indonesian context, it is expected that scientists who will be produced by a study program should be scientists with Indonesian personalities, not scientists who experience ideological disorientation who do not really know for whose benefit they are becoming scientists.
Examination Format/Assessment Methods	:	Group presentation 25%, Project citizen 25%, midterm 25%, final-exam 25%
Learning Media	:	Offline: 100%
Literature	:	-
Date of last amendment	:	August 8th, 2022

Module 92.b: Hindu Religion[AH17]

Hindu Religion[AH18] **(2 Credits/3.2 ECTS)**

Advanced Pharmacy Practice		
Code/Status	:	UNU 113/2.0/Compulsary
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	UGM Hindu Religion Course Team
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Class learning, Discussion, Paper task 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	(2 Credits/3.2ECTS)
Prerequisites	:	-
Course Learning Outcomes (CLO)		1. To develop students to become noble scholars who have Sradha and Bhakti, spiritual morality and broad views based on dharma and Satyam Sivam and Sundharam (truth, purity and harmony) in living life. 2. It is expected that students have broad insight in responding to various changes in society. And are able to interpret with essential values.

		3. Students have intellectuals in science, but are graceful in morality and uphold religious values. 4. Able to communicate, have a tolerant attitude in living life in society. 5. Uphold the values of humanism based on a sense of ahimsa.
Description	:	General Compulsory Courses as an effort to develop the abilities of Hindu Students manifested in the form of skills can provide students with the ability to understand, appreciate and carry out especially those related to, the Objectives and Functions of MKWU Hindu Religious Education in Building a Humanist Personality Base for Students, History of the Development of Hinduism, The Concept of Brahmavidya, Vedas as Holy Scriptures and Sources of Hindu Law, The Concept of Ideal Humans According to Hinduism, The Concept of Hindu Moral Teachings, Various Hindu Religious Arts, The Existence of Dharma Gita Tension, Living in Harmony from a Hindu Perspective, Hindu Leadership from a Nitisastra Perspective, Codification of Hindu Law, Economic Model from an Arthasastra Perspective, The Concept of Health According to Ayurveda, The Existence of Hindu Teachings in the Development of the Modern World. With this course material, students will be able to build awareness in the modern world.
Examination Format/Assessment Methods	:	Excersice 10%, daily task 10%, midterm 20%, final-exam 50%, presentation 10%
Learning Media	:	Offline: 100%

Literature :

1. Cassirer, E, 1987, Manusia dan Kebudayaan: Sebuah Esei Tentang Manusia, translated by Alois A. Nugroho, Gremedia, Jakarta.
2. Dillistone, F.W, 2003, Daya Kekuata Simbol, The Power of Symbols, translated by A. Widyatmartaya, Kanisius , Yogyakarta
3. Kajeng, Nyoman DKK, 1999, Sarasamuscaya Dengan Teks Bahasa Sansekerta dan Jawa Kuna, Paramita, Surabaya
4. Kamajaya Gede, 2000, Yoga Kundalini, Carauntuk mencapai Sidhi dan Mokas, Paramita, Surabaya.
5. Mantara, IB,1983/1984, Tata Susila Hindu Dharma, Parisadha Indoneisa Pusat, Jakarta.
6. Pendit, Nyoman S, 1979, Bhagawad Gita, Departemen Agama RI, Jakarta
7. Pudja, Gde, dan Sudarta Rai, 1976/1977, Menawa Dharmasastra, Manu Dharmasastra/Weda Smrti Compedium Hukum Hindu, CV. Junasco, Jakarta
8. Pudja, Gde, 1984, Sraddha, Mayasari, Jakarta
9. Pudja, Gede, 1992, Theologi Hindu (Brahma Widya), Dharma Saratih, Jakarta
10. Sura Gede, 2001, Pengendalian Diri dan Etika dalam ajaran agama Hindu, Hanoman Sakti, Jakarta
11. Team, 2001, Modul Keluarga Bahagia Sejahtra, Menurut Pandangan Hindu, Departemen Agama Pusat, Yakarta
12. Titib, I Made, 2003, Teologi dan Simbol-simbol Dalam Agama Hindu, Paramita, Surabaya
13. Team, 2004, Graha Jagadhita, Paramita, Surabaya
14. Wardhana, Ida Bagus Rai, 1963, Sosiologi Hindu Dharma, Departemen Agama Hindu dan Budha, Jakarta
15. Wiana Ketut, 1993, Bagaimana Umat Hindu menghayati Tuhan, Manikgeni Denpasar
16. Team, 2014, Mata kuliah Wajib Umum (MKWU) Pendidikan Agama Hindu,

Date of last amendment : August 8th, 2022

Module 92.c: Christian Religion[AH19]

Christian Religion[AH20] **(2 Credits/3.2 ECTS)**

Advanced Pharmacy Practice		
Code/Status	:	UNU 113/2.0/Compulsary
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	Pratomo Nugroho Soetrana, M.A.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Class learning, lecture, Game, Discussion, task 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	(2 Credits/3.2 ECTS)
Prerequisites	:	-
Course Learning Outcomes (CLO)	:	1. The ability to analyze, study, and respond critically and as objectively/completely as possible to religious issues, 2. A statement of his/her outlook on life that respects human values in the diversity of human life, especially the diversity of religious life.

Description	:	Adapted to the "context" of (1) Indonesian society and (2) students who are diverse in their theological beliefs/religious beliefs, as well as (3) the level of mental-intellectual development and the stage of development of religious beliefs/faith expected in students3, (4) students who are prospective scientists/intellectuals/leaders in their society, and (5) considerations in Law no. 12/2012 on Basic Higher Education Substance Study Group MPK Religious Education in the national curriculum, then beginning with a discussion on the MPK PAK approach, in this lecture will be discussed about: Religion and Dimensionality of Religion; The Nature of Religion and Religiousness, viewed in the context of Indonesia, academic scientific studies of religions/theology, and the Universal Declaration of Human Rights of the United Nations; Contradictory Reality in the Life of Religious Humans; Sacred Texts (Holy Scriptures): Texts and Contexts of Interpretation, and Tools to Help Understand Them; Personality, Faith, Religion, and the Development of Faith / Forms of Religious Experience and Behavior; Faith and Knowledge; Plurality of Religious Life and Peace (Understanding andRespecting Religious Differences, Overcoming Prejudice between Religious Communities, and Seeing the Meeting Points of the Noble Values of Humanity among Religions)
Examination Format/Assessment Methods	:	Task and discussions 30%, midterm 20%, final-exam 30%, presentation 20%
Learning Media	:	Offline: 100%
Literature	:	(a) Alkitab/ Kitab Suci: Perjanjian Lama dan Perjanjian Baru, Bogor: Lembaga Alkitab Indonesia, Bogor, 1974 (or edition/translation in another language) (mandatory for Christians - Protestants) You can also use the Bible through the Indonesian Bible Institute or the Sabda Foundation website. (b) The basic reference books for “basic theological-dogmatics” (not mandatory) are: 1. Hadiwijono, Harun. 1985. Iman Kristen, Jakarta: BPK Gunung Mulia. 2. ..... 1986. Inilah Sahadatku, Jakarta: BPK Gunung Mulia. 3. Soedarmo. 1991. Ikhtisar Dogmatika, Jakarta: BPK Gunung Mulia. (c) Basic reference material consideration book: Buku Ajar MKWU Pendidikan Agama Kristen, Dirjen Belmawa, Kemenristekdikti R.I., 2016 (Ebook)

(d) Complementary/enrichment reading, including:

1. Brownlee, Malcolm. 1986. Pengambilan Keputusan Etis, dan faktor-faktor di dalamnya, Jakarta: BPK Gunung Mulia.
2. Crapps, Robert W.1993. Dialog Psikologi dan Agama, Yogyakarta:Kanisius.
3. .....1994. Perkembangan Kepribadian dan Keagamaan,.....,
4. Caputo, John D. 2001, Agama Cinta, Agama Masa Depan, Bandung:Mizan.
5. Cremers, Agus. 1995. Tahap-tahap Perkembangan Kepercayaan,Yogyakarta: Kanisius.
6. Darmaputera, Eka. 1992. Pancasila, Identitas dan Modernitas,Jakarta: BPK Gunung Mulia.
7. ..... 2002. Beragama dengan Akal Sehat, Yogyakarta:Gloria Cyber M.
8. Dister, Nico Syukur. 1988. Pengalaman dan Motivasi Beragama,Yogyakarta: Kanisius.
9. Juergensmeyer, Mark. 2003. Terorisme Para Pembela Agama,Yogyakarta: Tarawang Press.
10. Kelsay, John & Twiss, Summer B. 2007. Agama dan Hak-hak Azasi Manusia, Yogyakarta: Dian/ Interfidei, cetakan II.
11. Keene, Michael. 2006. Agama-agama Dunia: Yogyakarta: Kanisius.
12. Lane, Tony. 1989. Runtut Pijar, Sejarah Pemikiran Kristen, Jakarta: BPK Gunung Mulia, 1989
13. Peters, Ted & Bennet, Gaymont. 2005. Menjembati Sains dan Agama, Jakarta: BPK Gunung Mulia & The Center for Theology and Natural Sciences, Berkeley.
14. Shenk, David W. 2001. Ilah-ilah Global: Menggali Peran Agama-0agama dalam Masyarakat Modern, Jakarta: BPK Gunung Mulia.
15. Smith, Huston. 2008. Agama-agama Manusia, Jakarta: Yayasan Obor, Jakarta.
16. Sumarthana, Th. Dkk. 2005. Pluralisme, Konflik & Pendidikan Agama di Indonesia, Yogyakarta: DIAN/ Interfidei.
17. Sutrisno, Mudji. 1996. Agama: Wajah Cerah & Wajah Pecah, Jakarta: Obor.
18. Thompson, Norman H. 1988. Religious Pluralism and Religious Education, Birmingham: Religious Education Press.

19. Wahid, Abdurrahman (dkk.). 1993., Dialog: Kritik & Identitas Agama, Yogyakarta: Dian/ Interfidei & Pustaka Pelajar.

Other sources that can be utilized include:

- Society, Religion and Technology Project; Church of Scotland, (http://www.srtp.org.uk)
- Ten Commandments of Computer Ethics, (http://www.luc.edu/infotech/sae/ten-commandments.html)

Date of last amendment : August 8th, 2022

Module 93: Pancasila Education[AH21]

Pancasila Education (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	[AH22] /Compulsary
Level	:	Undergraduate
Semester	:	IV
Course Coordinator/Lecturer	:	UGM Pancasila Education Course Team
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	1. Learning methods that can be used to develop the affective and skills domains include: Out bond, visits to museums/monuments/historical tourist attractions, orphanages, heroes' cemeteries, and/or social gatherings of figures, etc.; presentations, appreciation, and discussions of films, poems, and/or struggle songs; producing works that are useful for oneself, society, nation and state, including producing scientific/popular writings, books, blogs/websites/internet portals, posters, documentary films, etc.; conducting community service by becoming an activist/manager of student, religious, and community organizations as a learning model to become a leader. 2. To develop the knowledge domain, learning methods can be developed, including: pulpit lectures, public lectures, discussions, seminars, both online and offline; research, presentations, and group or class discussions both online and offline, etc; document research, making mind maps, book reviews, etc; presenting guest lecturers, interviewing figures, etc 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	(2 Credits/3.2ECTS)
Prerequisites	:	
Course Learning Outcomes (CLO)	:	1. Students are able to increase sensitivity, concern, and commitment to participate in resolving various fundamental problems of society, nation and state based on Pancasila values.

		2. Students are able to become role models of individuals and leaders who have the soul of Pancasila with indications of religious-tolerant, humanist, nationalist, democratic, and just. 3. Students are able to produce innovative-creative works to be dedicated to society, nation and state based on Pancasila values. 4. Students must be able to show the importance of Pancasila for students, UGM, the Republic of Indonesia, and the world, in the past, present and future. 5. Students must understand the meaning, content, function, position, and practice of Pancasila as the basis of the state, ideology and outlook on life of the nation, philosophical system, ethical basis for organizing the state, a
Description	:	This Minimum Standard Document for SYLLABUS/RPKPS Pancasila Education was prepared by the Pancasila Education Lecturer Team, UGM MKWU Coordinator, referring to the MKWU Mandatory Book for Pancasila Education of the Ministry of Research, Technology and Higher Education and developed by lecturers and based on the ideas developed in the UGM MKWU, February 2018. The standards are intended as normative references for leaders, lecturers, students, and education personnel in the context of standardization and quality improvement. The intended lecture standards include standards for objectives, achievements, substance, methods, evaluation, learning materials, lecturers, infrastructure and learning facilities. Considering that this document is a minimum standard, lecturers can develop innovations and creations for the classes they teach by using these standards.
Examination Format/Assessment Methods	:	Attitudes and skills 50%, midterm 25%, final-exam 25%
Learning Media	:	Offline: 100%
Literature	:	Main: 1. Soekarno, 1945, Pidato Lahirnya Pancasila, on the BPUPK council, document. 2. UGM, 2018, Pancasila Dasar Negara, collection of speeches, PSP UGM, Yogyakarta. 3. Notonagoro, 1951, Pancasila Dasar Falsafah Negara, UGM, document Speech of the Conferment of Honorary Doctorate Degree to Ir. Soekarno. 4. UGM, 1971, Pancasila Secara Ilmiah Populer, Pancuran Tujuh, Jakarta.

5. Pranarka, 1989, Sejarah Perumusan Pancasila, Jakarta.
6. Kaelan, 2002, Filsafat Pancasila, Paradigma, Yogyakarta.
7. Kusuma, A.B. 2004, Lahirnya Undang-Undang Dasar 1945: Menurut Authentic copy of document of Badan Oentoek Menjelidiki Oesaha2 Persiapan Kemerdekaan, Publishing Agency of Faculty of Law, UI, Jakarta.
8. Latif, Yudi, 2011, Negara Paripurna: Historisitas, Rasionalitas, dan Aktualitas Pancasila, Gramedia Pustaka Utama, Jakarta.
9. _____, 2014, Mata Air Keteladanan: Pancasila dalam Perbuatan, Mizan, Bandung.
10. Team of MKWU Pancasila Education Dikti, 2016, Buku Mata Kuliah Wajib Pendidikan Tinggi Pendidikan Pancasila, e-book, Kemenristek Dikti.

Electronic Documents/documentary films
1) Council of BUPK, PSP UGM.
2) Council PPKI, PSP UGM
3) Speech of Soekarno, 1960, Membangun Dunia Baru, on United Nations

Recommended portals:
1) Menara Ilmu Pancasila: http://pancasila.filsafat.ugm.ac.id
2) Web Pusat Studi Pancasila UGM: http://psp.ugm.ac.id
3) Jurnal Filsafat UGM: http://jurnal.ugm.ac.id/wisdom

Date of last amendment : 8 August 2022

Module 51: Biopharmaceutics

Biopharmaceutics (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221501/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Prof. Dr. Akhmad Kharis Nugroho, M.Si., Apt. (Coordinator) 2. Dr. Adhyatmika, M.Biotech., Apt. 3. Dr. Marlyn Dian Laksitorini, M.Sc., Apt. 4. Dr. Abdul Karim Zulkarnain, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacokinetics (FAF 221301)
Course Learning Outcomes (CLO)	:	1. Understand and master the meaning, scope, objectives and benefits as well as the relationship of Biofarmasetics with pharmaceutical science and profession. 2. Understand the factors that affect drug absorption, efforts to improve drug absorption, and the concept of drug absorption. 3. Understand the importance of drug absorption studies in vitro, in situ and in vivo, and the concept of drug bioavailability. 4. Understand drug formula design and drug product evaluation, to achieve optimal therapeutic effects 5. Able to apply the concept of population-based biopharmaceutics modeling and computation, the concept of intrinsic dissolution speed of drugs to achieve optimal therapeutic effects. intrinsic dissolution speed of drugs for the formulation of their preparations, the process of absorption studies in vitro and in situ, as well as the process of absorption of drugs. in situ, and percutaneous drug absorption process.

Description	:	The course "Biofarmasetics" consists of learning through lectures (2 credits) and laboratory practice (1 credit). Overall, the Biofarmasetics course contains material on drug transport through biological membranes, physicochemical factors of drugs and drug products, anatomical and physiological factors where drugs are applied, absorption properties of drugs, and drug absorption. physicochemical factors of drugs and drug products, anatomical and physiological factors where drugs are applied, absorption properties of drugs in vitro, in situ and in vivo. in vitro, in situ and in vivo, introduction to population-based biopharmaceutics approaches, bioavailability and bioequivalence of drug products, various factors that can affect the absorption of drugs and drug products, efforts to improving drug absorption, formula design Biopharmaceutics Practical Work learns and practices firsthand the introduction of modeling and computational population-based biopharmaceutics. population-based biopharmaceutics modeling and computing, the importance of intrinsic dissolution velocity studies of drugs in the preformulation of its preparation; the effect of pH on per-oral absorption of drugs in vitro; the effect of pH on per-oral absorption of drugs in situ; and percutaneous absorption of drugs in vitro.
Examination Format/Assessment Methods	:	35% participatory activities and project, 25% laboratory practice, 20% midterm exam, 20% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Amidon, G.L., Lee, PI., and Topp, E.M., 2000, Transport Processes in Pharmaceutical Systems, Marcel Dekker, New York. 2. Banakar, U., 1992, Pharmaceutical Dissolution Testing, Marcel Dekker Inc., New York. 3. Dressman, J.B. and Lennernas, H., 2000, Oral Drug Absorption Prediction and Assessment,Marcel Dekker Inc., New York. 4. Dressman, J. and Kramer, J., 2005, Pharmaceutical Dissolution Testing, Taylor & Francis,Boca Raton. 5. Shargel, L., Wu-Pong, S., and Yu, A.B.C., 2005, Applied Biopharmaceutics & Pharmacokinetics, 5th Edition, McGraw Hill, Boston. 6. Welling, P.G., Tse, F.L.S., Dighe, S.V., 1991, Pharmaceutical Bioequivalence, Marcel Dekker,New York. Additional : 1. Banker, G.S., and Rhodes, CT., 1996, Modern Pharmaceutics, Marcel Dekker Inc., New York.

2. Ritschel W.A. and Kearns, G.L., 2004, Handbook of Basic Pharmacokinetics Including Clinical Applications, 6th Edition, American Pharmaceutical Association, Washington, D.C.
3. Sinko, P.J., 2006, Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th Edition,Lippincott Williams & Wilkins, Philadelphia.

Date of last amendment: 8 August 2022

Module 52: Drug Education and Information

Drug Education and Information (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221503/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Anna Wahyuni Widayanti, MPH., Apt., Ph.D. (Coordinator) 2. Niken Nur Widyakusuma, M.Sc., Apt. 3. Rizka Prita Yuliani, M.Pharm., Apt. 4. Fivy Kurniawati, S.Farm., Apt., M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Social Behavioural Sciences for Pharmacy (FAF 221208)
Course Learning Outcomes (CLO)	:	1. Students are able to analyze the credibility of pharmaceutical information sources and formulate this information in the educational process. 2. Students are able to apply effective communication methods for providing drug information to patients, other healthcare professionals, and the community. 3. Students are able to design the counseling process for patients. 4. Students are able to design educational programs for the community through both print and electronic media.
Description	:	The course Drug Education and Information is related to techniques of collecting, searching, analyzing, and providing information that support effective communication, the application of communication techniques, and effective counseling. It also involves building interpersonal and interprofessional relationships, dealing with electronic communication, developing educational programs about drugs and treatments, selecting Patient Education Materials (PEM) in both print and audiovisual formats, and evaluating drug and treatment advertisements.

Examination Format/Assessment Methods	:	20% participatory activities, 30% project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Aspden, P., Wolcott, J.A., Bootman, J.L., Cronenwett, L.R., 2006, Preventing Medication Errors, The National Academic Press, Washington D.C. 2. Malone, P.M., Mosdell, K.W., Kier, K.L., Stanovich, J.E., 2001, Drug Information : A Guide for Pharmacist, 2nd Ed., McGraw-Hill Companies, New York. 3. McClellan, M.B., McGinnis, J.M., Nabel, E.G., Olsen, L.M., 2007, Evidence-Based Medicine and The Changing Nature of Health Care : IOM Annual Meeting Summary, The National Academic Press, Washington D.C. 4. Rantucci, M.J., 1997, Pharmacist Talking with Patients, A Guide to Patient Counseling, 1th Ed, Williams & Winkins, Baltimore, Maryland. 5. Beardsley, R.S., Kimberlin, C.L. & Tindall, W.N., 2008. Communication Skills in Pharmacy Practice : A Practical Guide for Students and Practitioners Fifth.,Philadelphia,USA: Lippincott Williams & Wilkins. 6. Boesen, K.P. et al., 2009. Improvisational Exercises to Improve Pharmacy Students ' Professional Communication Skills. , 73(2). 7. Northouse, Peter G., Northhouse, L.L., 1992. Health Communication : Strategies for Health Professionals 2nd ed. S. Brottmiller, Wiliam, Kintzler, ed., Connecticut, USA: Appleton & Lange. 8. Smith, W.T. et al., 2011. Disability in cultural competency pharmacy education. American journal of pharmaceutical education, 75(2), p.26. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3073100&tool=pmcentrez&rendertype=abstract 9. Tietze, K.J., 2004. Clinical Skills for Pharmacists : A Patient-Focused Approach 2nd ed., Philadelphia,USA: Mosby Inc. 10. Berger, Bruce A.,2005, Communication Skills for Pharmacists: Building relationships, Improving Patient Care, 3rd ed. American Pharmacists Association Note : Including reference sources from forms of integration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 53 : Pharmacoephidemiology (FAF 221504)

Pharmacoephidemiology (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221504/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Prof. Dr. Tri Murti Andayani, SpFRS, Apt (Coordinator) 2. Prof. Dr. Ika Puspitasari, M.Si., Apt 3. Fivy Kurniawati, Mpharm., Apt 4. Niken Nur Widyakusuma, S.Farm., M.Sc
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion and Q&A 3. Project-based learning (Team-based Project). In each class, students are divided into 16 groups. Each group will be given one question to be solved as a group by looking for at least 3 references to answer the related questions. The aspects asked are related to the application of biostatistics, variable and interpretation of study results, study design, and pharmacovigilance of pharmacoepidemiology studies. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacology (FAF 221203)
Course Learning Outcomes (CLO)	:	1. Students are able to explain the basic concepts of pharmacoepidemiology and biostatistical principles in the study of pharmacoepidemiology. 2. Students are able to plan and select an appropriate design for pharmacoepidemiology study. 3. Students are able to analyze the results of pharmacoepidemiology studies and the application of pharmacoepidemiology studies in pharmaceutical services.
Description	:	The course "Pharmacoepidemiology" explains the basic concepts of pharmacoepidemiology, biostatistical principles in epidemiological studies, research design in the field of pharmacoepidemiology, outcome parameters used in pharmacoepidemiological studies, and data sources in

		pharmacoepidemiological studies, so that students are able to apply the results of pharmacoepidemiological studies to identify, evaluate, and explain drug use problems and solutions at the population level.
Examination Format/Assessment Methods	:	15% participatory activities, 35% project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Holloway, K. & van Djik, L., 2011, The World Medicines Situation 2011: Rational Use of Medicines, Geneva: World Health Organization. 2. Rothman, K.J, 2012, Epidemiology an introduction, 2nd edition, Oxford University Press, New York 3. Rosner, B, 2011, Fundamentals of biostatistics, 7th edition, Brooks/Cole Cengage Learning, Boston.

Date of last amendment: 8 August 2022

Module 54: Pharmacognosy - Phytochemistry

Pharmacognosy - Phytochemistry (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221505/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr.rer.nat. Yosi Bayu Murti, M.Si., Apt. (Coordinator) 2. Prof. Dr. Subagus Wahyuono, M.Sc., Apt. 3. Dr. Erna Prawita Setyowati, M.Si., Apt. 4. Dr. Andayana Puspitasari Gani, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Organic Chemistry II (FAF 221211)
Course Learning Outcomes (CLO)	:	1. Students are able to explain the sources of efficacious substances and supporters of efficacy derived from nature 2. Students are able to explain the diversity of structures, biosynthetic pathways and physical and chemical properties of natural material compounds 3. Students are able to describe methods of identifying natural ingredient compounds in raw materials, simplisia and extracts by macroscopy, microscopy and physico-chemistry.
Description	:	The course “Pharmacognosy-Phytochemistry” discusses basic scientific aspects, the relationship between secondary metabolites or metabolite profiles (markers) in relation to the pharmacological / biological effects of natural medicinal products, including the structure of metabolite groups with bioactivity, chemical structure, qualitative / quantitative analysis, usefulness in medicine and the development of natural medicine in the health sector.
Examination Format/Assessment Methods	:	62% participatory activities and project, 19% midterm exam, 19% final exam.

Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Bladt, S. (2009). Plant drug analysis: A thin layer chromatography atlas (2nd ed.). Berlin, Germany: Springer Berlin. 2. Dewick, P. M. (2009). Medicinal natural products: A biosynthetic approach (3rd ed.). Hoboken, NJ:Wiley-Blackwell. 3. Hillisch, A., & Hilgenfeld, R. (Eds.). (2002). Modern methods of drug discovery (2003rd ed.). Basel,Switzerland: Birkhauser Verlag AG. 4. Sarker, Satyajit D., Latif, Z., & Gray, A. (2005). Natural Products Isolation (2nd ed.; Satya D. Sarker, Ed.). doi:10.1385/1592599559 5. Seigler, D. S. (1994). Plant Secondary Metabolism (1998th ed.). London, England: Chapman and Hall. Additional : Other recent related sources (scientific articles from internationally reputable journals)

Date of last amendment: 8 August 2022

Module 55: Pharmacotherapy II

Pharmacotherapy II (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221507/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Prof. Dr. Zullies Ikawati, Apt. (Coordinator) 2. Dr. Fita Rahmawati, Sp.FRS., Apt. 3. Prof. Dr. Tri Murti Andayani, Sp.FRS., Apt. 4. Dr. Nanang Munif Yasin, M.Pharm., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using case-based learning method 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacotherapy I (FAF 221403)
Course Learning Outcomes (CLO)	:	1. Students are able to explain pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of drugs, as well as providing information and education in patients with respiratory disorders 2. Students are able to explain pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of drugs, as well as providing information and education for patients with digestive disorders 3. Students are able to explain pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of drugs, as well as providing information and education on bacterial, viral and parasitic infectious diseases. 4. Students are able to explain the pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of drugs, as well as providing information and education on bacterial, viral and parasitic infectious diseases and side effects of drugs, as well as providing information and education on eye disorders, ear and larynx

Description	:	The course "Pharmacotherapy II" studies the therapeutic management of Allergic Rhinitis, Asthma, Chronic Obstructive Pulmonary Disease (COPD), Peptic Ulcer, GERD, Hepatitis, Glaucoma, Acute Respiratory Infection (ARI), Tuberculosis (TB), Urinary Tract Infection (UTI), Human Immunodeficiency Virus/Acquired Immunodeficiency Syndromes (HIV/AIDS), Malaria and Dengue Fever, Pneumonia and Digestive Infections.
Examination Format/Assessment Methods	:	30% participatory activities and project, 30% midterm exam, 40% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Dipiro, J.T., et al. 2011, Pharmacotherapy: A Pathophysiologic Approach, 8th Ed, McGraw-Hill, New York 2. Kementerian Kesehatan Republik Indonesia, 2011, Modul Penggunaan Obat Rasional, Jakarta:Kementerian Kesehatan Republik Indonesia. Additional : 1. Alldredge, B.K., et al., 2013, Koda-Kimble & Young's Applied Therapeutics: The Clinical Use Of Drugs, 10th Ed, Lippincott Williams & Wilkins, Philadelphia 2. Brunton, L.L., et al. 2012, Goodman & Gilman's The Pharmacological basic of therapeutic, 12th Ed, McGraw-Hill, New York 3. Helms, R.A., et al. 2006, Textbook of Therapeutics, Drug and Disease Management, 8th Ed., Lippincot & Williams, Philadelphia 4. Holloway, K. & van Djik, L., 2011, The World Medicines Situation 2011: Rational Use of Medicines, Geneva: World Health Organization. 5. Scwinghammer, T.L. & Koehler, J.M., 2009, Pharmacotherapy Casebook: A Patient Focused Approach, 7th Ed., McGraw-Hill, New York

Date of last amendment: 8 August 2022

Module 56: Prescription

Prescription (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221508/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr. Susi Ari Kristina, M. Kes., Apt. (Coordinator) 2. Dr. Nanang Munif Yasin., M.Pharm., Apt. 3. Muvita Rina Wati, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given a task to be completed together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmaceutics II (FAF 221204) Pharmacotherapy I (FAF 221403)
Course Learning Outcomes (CLO)	:	1. Students can solve the administrative and pharmaceutical problems of prescription in the community, primary care clinics (Puskesmas), clinics, and hospitals 2. Students can solve clinical problems of prescriptions in the community, primary care clinics (Puskesmas), clinics, and hospitals 3. Students can solve incompatibility in the compounding cases of the sterile preparations and veterinary prescriptions 4. Students can dispense prescriptions to the patients following the procedures
Description	:	The prescription course discusses the basic of prescription, copy of prescription, dispensing and its regulatory, and administrative, pharmaceutics, and clinical screening of prescriptions.This course is given in 2 main forms, namely lectures in the classroom and also practicum.

		Practicum is conducted to provide students with experience and skills on examples of screening of prescriptions and compounding and dispensing skills.
Examination Format/Assessment Methods	:	12,5% participatory activities, 50% project, 15% midterm exam, 22,5% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Allen, Lyod V., 2002, The art, science, and technology of pharmaceutical compounding/ Lyod V. Allen Jr. 2nd ed, Washington D.C.: the American Pharmaceutical Association 2. Cipolle, R.J., Strand, L.M., Morley, P.C., 2004, Pharmaceutical Care Practice: Clinician's Guide, 2nd Ed, McGraw Hill Professional, New York 3. Kemenkes RI, 2016, Peraturan Menteri Kesehatan Nomor 73 Tahun 2016 tentang Standar Pelayanan Kefarmasian di Apotek, Jakarta: Kementrian Kesehatan RI. 4. Tietze, K.J., 2012, Clinical Skill for Pharmacist, 3rd Ed, Mosby, St.Louis Additional : 1. https://acadstaff.ugm.ac.id/karya_files/prescribing-pattern-at-primary-health-care-in-developing-countries---a-systematic-review-dcfcd07e645d245babe887e5e2daa016 2. https://acadstaff.ugm.ac.id/karya_files/practice-and-opinion-of-pharmacists-toward-disposal-of-unused-medicines-in-indonesia-dcfcd07e645d245babe887e5e2daa016 3. https://acadstaff.ugm.ac.id/karya_files/menjadi-narasumber-materi-compounding-dan-dispensing-obat-hewan-sebanyak-3-sesi-pada-pelatihan-farmasi-veteriner-bertema-basic-courses-in-ve-dcfcd07e645d245babe887e5e2daa016 4. https://acadstaff.ugm.ac.id/karya_files/edukasi-interaktif-pengobatan-hipertensi-dcfcd07e645d245babe887e5e2daa016 5. https://acadstaff.ugm.ac.id/karya_files/penyuluhan-penggunaan-obat-pada-ibu-hamil-dan-menyusui-di-padukuhan-blimbingsari-dcfcd07e645d245babe887e5e2daa016 Note : Including reference sources from forms of integration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 57: Pharmaceutical Immunology

Pharmaceutical Immunology (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221510/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. apt. Muhammad Novrizal Abdi Sahid, M.Eng., Ph.D. (Coordinator) 2. Dr. apt. Muthi` Ikawati, M.Sc. 3. Dr. apt. Riris I. Jenie, M.Si. 4. drh. Retno Murwanti, M.P., Ph.D.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, students will listen to the lecturer's explanation 2. Discussion, students will ask questions or answer questions on a problem 3. Team-based Project, students will be divided into several groups, then given an assignment to complete together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course 4. Case-based learning/PBL/other SCL methods, students will be given real problems in society, then asked to identify the root of the problem and try to find a solution (according to the presentation in the lecture) 50 minutes per week for 14 weeks in one semester
Workload	:	60 minutes of in-class lectures 60 minutes of structured assignment activities 60 minutes of independent activities In total 170 minutes/week In 16 weeks = 2720 minutes = 45.335 hours 1 ECTS = 28 hours
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmacology (FAF 221203) Molecular Biology (FAF 221201)
Course Learning Outcomes (CLO)	:	1. Understanding the basic concepts of immunology related to pharmaceuticals which includes the classification of the immune system; components of the immune system; and mechanisms of the immune system in innate and adaptive immune responses, mucosal immune responses, immunological and autoimmune tolerance, and hypersensitivity. 2. Intepreting the latest immunological research results from scientific articles related to pharmaceutical sciences

Description	:	The Pharmaceutical Immunology course discusses the basics of immunology, especially those related to pharmaceuticals, including the introduction of immune responses (innate and adaptive immune responses), components of the immune system, processing and presentation of antigens, antibodies, mucosal immune system, hypersensitivity, immunological tolerance, and autoimmunity. This course is given in 2 main forms, namely in-class lectures and practicum. Practicums are conducted to provide experience and skills to students on examples of application of antigen-antibody reactions and immunological techniques for pharmaceuticals.
Examination Format/Assessment Methods	:	10% participatory activities, 50% project, 20% midterm exam, 20% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Abbas A, Lichtman AH, and Pillai S, 2022, Cellular and Molecular Immunology, 10th Ed., WB Saunders Co., Philadelphia. 2. Delver J, Martin SJ, Burton DR, and Roitt IM, 2017, Roitt's Essential Immunology, 13th Ed., John Wiley & Sons, Inc., Chichester, West Sussex. 3. Flaherty D, 2012, Immunology for Pharmacy, Elsevier, Mosby, Missouri. 4. Vajdy M. (editor), 2008, Immunity Against Mucosal Pathogens, Springer Science Business Media. 5. Harlow E and Lane D, 2014, Antibodies: A Laboratory Manual, 2nd Ed., Cold Spring Harbor Laboratory Press, New York. 6. Ausubel FM, Brent R, Kingston RE, Moore DD, Seidman JG, Smith JA, and Struhl K, 2002, Short Protocols in Molecular Biology, 5th Ed., Wiley, New York. Additional : 1. https://www.youtube.com/watch?v=T-hJDEb6VDo (integrasi pengabdian masyarakat dan kuliah) 2. Ikawati M, Anggoro DC, Hijriyanti AP, Putra A, Wangi GTS, and Pratiwi ST, 2021, Locally bred rabbits (Lepus nigricollis Cuvier) for antibody production, Research Journal of Biotechnology, 16(6): 77-83. (integrasi penelitian dan kuliah) 3. Putri DDP, Maran GG, Kusumastuti Y, Susidarti RA, Meiyanto E, and Ikawati M, Acute toxicity evaluation and immunomodulatory potential of hydrodynamic-cavitation extract of citrus peels. Journal of Applied Pharmaceutical Science, 12(4): 136-145. http://dx.doi.org/10.7324/JAPS.2022.120415 (integrasi penelitian dan kuliah/praktikum) ntegration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 58: Pharmaceutical Services

Pharmaceutical Services (3 Credits/4.8ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221512/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr. apt. Chairun W., M.Kes., M.App.Sc. Prof (Coordinator) 2. Prof. Dr. apt. Susi Ari Kristina, S.Farm., M.Kes. 3. Dr. apt. Dwi Endarti, M.Si. 4. apt. Muvita Rina Wati, S.Farm., M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 150 minutes per week for 14 weeks in one semester
Workload	:	150 minutes of in - class lectures 180 minutes of structured assignment activities 180 minutes of independent activities In total 510 minutes/week in 16 week = 8160 minutes = 136.005 hours 1 ECTS = 28 hours
Credits	:	3 Credits/4.8 ECTS
Prerequisites	:	Pharmacotherapy I (FAF 221403) Pharmaceutics II (FAF 221204)
Course Learning Outcomes (CLO)	:	1. Able to evaluate pharmaceutical services in accordance with the competence and role of the pharmacist profession in health services. 2. Able to analyze problems related to drug related problems and medication errors and the role of pharmacists in Medication Therapy Management. 3. Able to prepare a written patient care plan based on assessment 4. Able to solve pharmaceutical service case problems in health centers, pharmacies, and hospitals.
Description	:	The course "Pharmaceutical Services" discusses the concept of pharmaceutical services, the role of pharmacists in pharmaceutical services, rational drug use, problems in drug use (DRP, ME), drug interactions, patient data collection, as well as discussions on comprehensive pharmaceutical service case problems in the settings of health centers, pharmacies, and hospitals.

Examination Format/Assessment Methods	:	50% participatory activities and project, 30% midterm exam, 20% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Cipolle RJ, Strand LM, Morley PC. Pharmaceutical Care Practice 2nd ed., McGraw Hill. 2004 2. Rovers, JP., Currie, J.D., Hagel, H.P., McDonough R.P., Sobotka, J.L (edt), 2003, A Practical Guide to Pharmaceutical Care, American Pharmacist Association, Washington, D.C 3. Thompson, JE A Practical Guide to Contemporary Pharmacy Practice 3rd. ed., Lippincott. 2009. 4. Weicdenmayer, K., Sumers, R. S., Mackie C.A., Gaus, D.G.S., Everard, 2006, Developing Pharmacy Practice, A focus on Patient Care, WHO and IPF, Genewa 5. Jones, RM and RM Rospond. Patient Assessment in Pharmacy Practice 2nd. Ed., Lippincott. 2008 6. Peraturan Menteri Kesehatan tentang Standar Pelayanan Kefarmasian di Apotek, Puskesmas dan Rumah Sakit

Date of last amendment: 8 August 2022

Module 59: Quality Assurance of Medical Devices and Cosmetics

Quality Assurance of Medical Devices and Cosmetics (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221513/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr. rer. nat. apt. Siti Nurul Hidayah (Coordinator) 2. Prof. Dr. rer. nat. apt. R. R. Endang Lukitaningsih 3. Dr. apt. Bondan Ardiningtyas 4. Dr. Sylvia Utami Tunjung Pratiwi
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: tutorial, discussion, interactive quiz, presentation 50 minutes per week for 14 weeks in one semester
Workload	:	50 minutes of in-class lectures 60 minutes of structured assignment activities 60 minutes of independent activities In total 170 minutes/week In 16 weeks = 2720 minutes = 45.335 hours 1 ECTS = 28 hours
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Chromatography (FAF 221406)
Course Learning Outcomes (CLO)	:	1. Able to evaluate the quality of medical devices and cosmetic preparations in terms of fulfilment of regulatory and analytical aspects. 2. Able to critically examine regulations and scientific references on analytical methods related to medical devices and cosmetics.
Description	:	This course studies the quality assurance process of medical devices and cosmetic preparations. The lecture will review aspects of regulatory requirements that must be met for medical devices and cosmetic preparations as well as the stages of the quality assurance process in terms of analysis. The analysis will be emphasized on the analysis of the presence of bacteria & fungi, analysis of moisturizers, dyes, sunscreens, whitening, antioxidants, perfumes, and protein/peptide-based cosmetics.
Examination Format/Assessment Methods	:	50% project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Salvador A. And Chisvert A., 2007, Analysis of Cosmetic Products, 1st Ed., Elsevier, Netherland

2. Draelos Z.D and Thaman L.A., 2009, Cosmetic Formulation of Skin Care Products, Taylor&Francis, New York
3. Betton C.I., 2007, Global Regulatory Issues for the Cosmetics Industry, Vol I, William Andrew Inc
4. Bonadonna, L., Briancesco, R., Semproni, M. (2018). Microbiological Inspections of Different Medical Devices. Microchemical Journal, 136, 283-286.
5. Food Drug Administration. (2022). Quality and Compliance (MedicalDevices).https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/quality-and-compliance-medical-devices

Additional :

1. Hidayah, S.N., Hastuti, A.A.M.B. (2023). Comprehensive Estimation of Measurement Uncertainty in Determination of Antioxidant Activity in Natural Product by 2,2'-Diphenil-1-picrylhydrazyl (DPPH) Radical Scavenging Assay. Chemical papers, 77/4579–4587
2. Hidayah, S. N., Biabani, A., Gaikwad, M., Nissen, P., Voss, H., Riedner, M., Schlueter, H., Siebel, B. (2023). Aplication of Sample Displacement Batch Chromatography for Fractionation of Proteoform. Proteomics, 202200424, 1-12.

Note : Including reference sources from forms of integration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 60: Biopharmaceutics Practical Work

Biopharmaceutics Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221502/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Prof. Dr. Akhmad Kharis Nugroho, M.Si., Apt. (Coordinator) 2. Dr. Adhyatmika, M.Biotech., Apt. 3. Dr. Marlyn Dian Laksitorini, M.Sc., Apt. 4. Dr. Abdul Karim Zulkarnain, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmacokinetics (FAF 221301)
Course Learning Outcomes (CLO)	:	1. Understand and master the meaning, scope, objectives and benefits as well as the relationship of Biofarmasetics with pharmaceutical science and profession. 2. Understand the factors that affect drug absorption, efforts to improve drug absorption, and the concept of drug absorption. 3. Understand the importance of drug absorption studies in vitro, in situ and in vivo, and the concept of drug bioavailability. 4. Understand drug formula design and drug product evaluation, to achieve optimal therapeutic effects 5. Able to apply the concept of population-based biopharmaceutics modeling and computation, the concept of intrinsic dissolution speed of drugs to achieve optimal therapeutic effects. intrinsic dissolution speed of drugs for the formulation of their preparations, the process of absorption studies in vitro and in situ, as well as the process of absorption of drugs. in situ, and percutaneous drug absorption process.
Description	:	The course "Biofarmasetics" consists of learning through lectures (2 credits) and laboratory practice (1 credit). Overall, the Biofarmasetics course contains material on drug transport through biological membranes, physicochemical factors of drugs and drug products, anatomical and physiological factors where drugs are applied, absorption properties of

		drugs, and drug absorption. physicochemical factors of drugs and drug products, anatomical and physiological factors where drugs are applied, absorption properties of drugs in vitro, in situ and in vivo. in vitro, in situ and in vivo, introduction to population-based biopharmaceutics approaches, bioavailability and bioequivalence of drug products, various factors that can affect the absorption of drugs and drug products, efforts to improving drug absorption, formula design Biopharmaceutics Practical Work learns and practices firsthand the introduction of modeling and computational population-based biopharmaceutics. population-based biopharmaceutics modeling and computing, the importance of intrinsic dissolution velocity studies of drugs in the preformulation of its preparation; the effect of pH on per-oral absorption of drugs in vitro; the effect of pH on per-oral absorption of drugs in situ; and percutaneous absorption of drugs in vitro.
Examination Format/Assessment Methods	:	35% participatory activities and project, 25% laboratory practice, 20% midterm exam, 20% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Amidon, G.L., Lee, PI., and Topp, E.M., 2000, Transport Processes in Pharmaceutical Systems, Marcel Dekker, New York. 2. Banakar, U., 1992, Pharmaceutical Dissolution Testing, Marcel Dekker Inc., New York. 3. Dressman, J.B. and Lennernas, H., 2000, Oral Drug Absorption Prediction and Assessment,Marcel Dekker Inc., New York. 4. Dressman, J. and Kramer, J., 2005, Pharmaceutical Dissolution Testing, Taylor & Francis,Boca Raton. 5. Shargel, L., Wu-Pong, S., and Yu, A.B.C., 2005, Applied Biopharmaceutics & Pharmacokinetics, 5th Edition, McGraw Hill, Boston. 6. Welling, P.G., Tse, F.L.S., Dighe, S.V., 1991, Pharmaceutical Bioequivalence, Marcel Dekker,New York. Additional : 1. Banker, G.S., and Rhodes, CT., 1996, Modern Pharmaceutics, Marcel Dekker Inc., New York. 2. Ritschel W.A. and Kearns, G.L., 2004, Handbook of Basic Pharmacokinetics Including Clinical Applications, 6th Edition, American Pharmaceutical Association, Washington, D.C. 3. Sinko, P.J., 2006, Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th Edition,Lippincott Williams & Wilkins, Philadelphia.

Date of last amendment: 8 August 2022

Module 61: Pharmacognosy – Phytochemistry Practical Work

Pharmacognosy – Phytochemistry Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221506/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr.rer.nat. Yosi Bayu Murti, M.Si., Apt. (Coordinator) 2. Prof. Dr. Subagus Wahyuono, M.Sc., Apt. 3. Dr. Erna Prawita Setyowati, M.Si., Apt. 4. Dr. Andayana Puspitasari Gani, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Organic Chemistry II (FAF 221211)
Course Learning Outcomes (CLO)	:	1. Students are able to explain the sources of efficacious substances and supporters of efficacy derived from nature 2. Students are able to explain the diversity of structures, biosynthetic pathways and physical and chemical properties of natural material compounds 3. Students are able to describe methods of identifying natural ingredient compounds in raw materials, simplisia and extracts by macroscopy, microscopy and physico-chemistry.
Description	:	The course “Laboratory Practice in Pharmacognosy-Phytochemistry” discusses basic scientific aspects, the relationship between secondary metabolites or metabolite profiles (markers) in relation to the pharmacological / biological effects of natural medicinal products, including the structure of metabolite groups with bioactivity, chemical structure, qualitative / quantitative analysis, usefulness in medicine and the development of natural medicine in the health sector.
Examination Format/Assessment Methods	:	62% participatory activities and project, 19% midterm exam, 19% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary :

1. Bladt, S. (2009). Plant drug analysis: A thin layer chromatography atlas (2nd ed.). Berlin, Germany: Springer Berlin.
2. Dewick, P. M. (2009). Medicinal natural products: A biosynthetic approach (3rd ed.). Hoboken, NJ:Wiley-Blackwell.
3. Hillisch, A., & Hilgenfeld, R. (Eds.). (2002). Modern methods of drug discovery (2003rd ed.). Basel,Switzerland: Birkhauser Verlag AG.
4. Sarker, Satyajit D., Latif, Z., & Gray, A. (2005). Natural Products Isolation (2nd ed.; Satya D. Sarker, Ed.). doi:10.1385/1592599559
5. Seigler, D. S. (1994). Plant Secondary Metabolism (1998th ed.). London, England: Chapman and Hall.

Additional :
Other recent related sources (scientific articles from internationally reputable journals)

Date of last amendment: 8 August 2022

Module 62: Prescription Practical Work

Prescription Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221509/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr. Susi Ari Kristina, M. Kes., Apt. (Coordinator) 2. Dr. Nanang Munif Yasin., M.Pharm., Apt. 3. Muvita Rina Wati, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given a task to be completed together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course. 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmaceutics II (FAF 221204) Pharmacotherapy I (FAF 221403)
Course Learning Outcomes (CLO)	:	1. Students can solve the administrative and pharmaceutical problems of prescription in the community, primary care clinics (Puskesmas), clinics, and hospitals 2. Students can solve clinical problems of prescriptions in the community, primary care clinics (Puskesmas), clinics, and hospitals 3. Students can solve incompatibility in the compounding cases of the sterile preparations and veterinary prescriptions 4. Students can dispense prescriptions to the patients following the procedures
Description	:	The course “Prescription Practical Work” discusses the basic of prescription, copy of prescription, dispensing and its regulatory, and administrative, pharmaceutics, and clinical screening of prescriptions.This course is given in 2 main forms, namely lectures in the classroom and also practicum. Practicum is conducted to provide students with experience and skills on examples of screening of prescriptions and compounding and dispensing skills.

Examination Format/Assessment Methods	:	12,5% participatory activities, 50% project, 15% midterm exam, 22,5% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Allen, Lyod V., 2002, The art, science, and technology of pharmaceutical compounding/ Lyod V. Allen Jr. 2nd ed, Washington D.C.: the American Pharmaceutical Association 2. Cipolle, R.J., Strand, L.M., Morley, P.C., 2004, Pharmaceutical Care Practice: Clinician's Guide, 2nd Ed, McGraw Hill Professional, New York 3. Kemenkes RI, 2016, Peraturan Menteri Kesehatan Nomor 73 Tahun 2016 tentang Standar Pelayanan Kefarmasian di Apotek, Jakarta: Kementrian Kesehatan RI. 4. Tietze, K.J., 2012, Clinical Skill for Pharmacist, 3rd Ed, Mosby, St.Louis Additional : 1. https://acadstaff.ugm.ac.id/karya_files/prescribing-pattern-at-primary-health-care-in-developing-countries---a-systematic-review-dcfcd07e645d245babe887e5e2daa016 2. https://acadstaff.ugm.ac.id/karya_files/practice-and-opinion-of-pharmacists-toward-disposal-of-unused-medicines-in-indonesia-dcfcd07e645d245babe887e5e2daa016 3. https://acadstaff.ugm.ac.id/karya_files/menjadi-narasumber-materi-compounding-dan-dispensing-obat-hewan-sebanyak-3-sesi-pada-pelatihan-farmasi-veteriner-bertema-basic-courses-in-ve-dcfcd07e645d245babe887e5e2daa016 4. https://acadstaff.ugm.ac.id/karya_files/edukasi-interaktif-pengobatan-hipertensi-dcfcd07e645d245babe887e5e2daa016 5. https://acadstaff.ugm.ac.id/karya_files/penyuluhan-penggunaan-obat-pada-ibu-hamil-dan-menyusui-di-padukuhan-blimbingsari-dcfcd07e645d245babe887e5e2daa016 Note : Including reference sources from forms of integration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 63: Pharmaceutical Immunology Practical Work

Pharmaceutical Immunology Practicum (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221511/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr. apt. Muthi' Ikawati, M.Sc. (Coordinator) 2. apt. Muhammad Novrizal A. Sahid, M.Eng., Ph.D. 3. drh. Retno Murwanti, M.P., Ph.D. 4. Dr. apt. Riris Istighfari Jenie, M.Si. 5. Prof. Dr. apt. Edy Meiyanto, M.Si. 6. Dr. apt. Rumiyati, M.Si. 7. Prof. Dr.rer.nat. apt. Adam Hermawan, M.Sc. 8. apt. Setyowati Triastuti Utami, M.Sc., Ph.D. 9. Dr. apt. Siti Nurul Hidayah, M.Sc. 10. Dr.sci. apt. Rohmad Yudi Utomo, M.Sc. 11. Dr. Cintya Nurul Apsari, S.T.P., M.Si. 12. Dr. apt. Dyaningtyas Dewi P. Putri, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Project-based learning (team-based project, TBP), where students will be divided into several groups, then given a case to be solved together (problem-based learning, PBL). Completion of the task will be made in the form of a short report and presented through presentations and discussions with the lecturer and other participating students. 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Molecular Biology (FAF 221201) Molecular Biology Practicum (FAF 221202) Pharmacology II (FAF 221303)
Course Learning Outcomes (CLO)	:	1. Applying knowledge of the principles of immunology as well as the antigen-antibody reaction in the field of pharmacy and pharmaceutical sciences, including for drug development and disease identification. 2. Interpreting (evaluating) the latest immunologicalresearch results from scientific articles related to pharmaceutical sciences.
Description	:	The Pharmaceutical Immunology Practicum course provides students with experiences and skills on the examples of the application of antigen-antibody reaction and immunology techniques in the field of pharmacy and pharmaceutical sciences. While the basic theories of immunology, especially those related to the field of pharmacy (including immune responses and components of the immune system, antigen processing and

		presentation, antibodies, immunologic and autoimmune tolerance, hypersensitivity, immune responses to infections, and mucosal immune responses) are given in the form of lectures.
Examination Format/Assessment Methods	:	32% participatory activities, 32% project, 8% midterm exam, 30% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : Pharmaceutical Immunology Practicum Manual, First Semester of Academic Year 2022/2025, Faculty of Pharmacy UGM, Yogyakarta. Additional : 1. Putri DDP, Maran GG, Kusumastuti Y, Susidarti RA, Meiyanto E, and Ikawati M, Acute toxicity evaluation and immunomodulatory potential of hydrodynamic-cavitation extract of citrus peels. Journal of Applied Pharmaceutical Science, 12(4):136-145. http://dx.doi.org/10.7324/JAPS.2022.120415 (integration of research and practicum) 2. Nurrochmad A, Ikawati M, Puspitasari I, Murwanti R, and Nugroho AE, 2015, Immunomodulatory effects of ethanolic extract of Thyphonium flagelliforme (Lodd) Blume in rats induced by cyclophosphamide. Journal of Evidence-Based Complementary & Alternative Medicine, 20(3): 167-172. https://doi.org/10.1177/2156587214568347 (integration of research and practicum) 3. Nurliyani, Julia M, Harmayani E, Ikawati M, and Baliarti E, 2015, Potency of Lactobacillus plantarum Dad-13 and sweet potato (Ipomoea batatas) fiber as immunomodulator in rats infected with Salmonella typhimurium. Journal of Food Research, 4(3). https://doi.org/10.5539/jfr.v4n3p1 (integration of research and practicum) 4. Handayani S, Susidarti RA, Utomo RY, Meiyanto E, and Jenie RI, 2022, Synergistic Cytotoxic and Antimigratory Effect of Brazilein and Doxorubicin on HER2-Overexpressing Cells. Asian Pacific Journal of Cancer Prevention, 23(8): 2623–2632. https://doi.org/10.31557/APJCP.2022.23.8.2623 (integration of research and practicum) 5. Novitasari D, Meiyanto E, Kato J, and Jenie RI, 2022, Antimigratory Evaluation from Curcumin-Derived Synthetic Compounds PGV-1 and CCA-1.1 on HCC1954 and MDA-MB-231 Cells. Indonesian Journal of Cancer Chemoprevention. 13(2):71-82. http://dx.doi.org/10.14499/indonesianjcanchemoprev13iss2pp71-82 (integration of research and practicum)

Date of last amendment: 8 August 2022

Module 64: Quality Assurance for Medical Devices and Cosmetics Practical Work

Quality Assurance for Medical Devices and Cosmetics Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221514/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. apt. Halida Rahmania, M.Agr.Sc., Ph.D. (Coordinator) 2. Dr. apt. Agustina Ari Murti Budi Hastuti, S.Farm., M.Sc. 3. Prof. Dr. Abdul Rohman, S.F., M.Si., Apt. 4. Eka Noviana, S.Farm., M.Sc., Apt., Ph.D. 5. Dr. rer. nat. apt. Siti Nurul Hidayah, S.Farm., M.Sc. 6. Dr.rer.nat. Tatang Irianti, M.Sc., Apt. 7. Prof. Dr. rer.nat. apt. Adam Hermawan, S.Farm., M.Sc. 8. Dr. Riris Istighfari Jenie, M.Si., Apt. 9. apt. Navista Sri Octa Ujiantari, S.Farm., M.Sc., Ph.D. 10. apt. Rumiyati, S.Si., M.Si., Ph.D. 11. Dr. apt. Indah Purwantini, S.Si., M.Si. 12. Dr. Sylvia Utami Tunjung Pratiwi, S.Si., M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Team-based Project 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Chromatography (FAF 221406)
Course Learning Outcomes (CLO)	:	1. Able to understand and correctly demonstrate quality assurance (quality control) and evaluation (qualitative and quantitative) of medical devices and cosmetics. 2. Able to process data and evaluate the results of quality control analysis of medical devices and cosmetics to determine whether these medical devices and/or cosmetics meet the requirements.
Description	:	The course "Quality Assurance for Medical Devices and Cosmetics Practical Work" addresses the fundamentals of quality assurance (quality control) and the evaluation (both qualitative and quantitative) of medical devices and cosmetics, including: Determination of Rhodamine B Content in Cosmetics, Antioxidant Activity Test of Vitamin C Cosmetic Preparations, pH Meter Calibration and Buffer Solution Preparation, Bandages, and Microbiological Testing of Sterile Medical Devices/Cosmetics..
Examination Format/Assessment Methods	:	10% participatory activities, 25% pretest, 15% lab performance, 25% OSCE-like exam, 25% project

Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. BPOM. (2011). Identifikasi Bahan Pewarna yang Dilarang Dalam Kosmetik Secara Kromatografi Lapis Tipis (KLT) dan Kromatografi Cair Kinerja Tinggi (KCKT). Jakarta, Indonesia. 2. Departemen Kesehatan RI, (2014). Farmakope Indonesia Edisi V, Jakarta : Departemen Kesehatan RI. 3. Direktorat Jenderal Kefarmasian dan Alat Kesehatan. (2020). Farmakope Indonesia Edisi VI. Jakarta:Kementerian Kesehatan Republik Indonesia. 4. Ditjen POM RI. (1990). Keputusan Direktur Jenderal Pengawasan Obat Dan Makanan 00386/C/SK/II/90. Jakarta, Indonesia. 5. Laboratorium Kimia Analitik Fakultas Farmasi UGM (2019). Instruksi Kerja pH meter OHAUS Starter 300. Additional : 1. Donghong Liu, John Shi, Alejandra Colina Ibarra, Yukio Kakuda, Sophia Jun Xue, (2008). The scavenging capacity and synergistic effects of lycopene, vitamin E, vitamin C, and β-carotene mixtures on the DPPH free radical, LWT - Food Science and Technology, 41, 1344-1349. 2. 1. Taupik, M., Mustapa, M.A., Gonibala, S. (2021). Analisis Kadar Rhodamin B Pada Blush-On Menggunakan Metode Spektrofotometri Uv-Vis. Indonesian Journal of Pharmaceutical Education 1(2), 119-126. DOI : 10.37311/ijpe.v1i2.10666. 3. Goldberg, R. N., Kishore, N., & Lennen, R. M. (2002). Thermodynamic quantities for the ionization reactions of buffers. Journal of Physical and Chemical Reference Data, 31(2), 231-370. 4. Lukita, Bertha L., Setiawati, Henny Liu, (2008). Regionalisasi Laboratorium Pengujian Sterilitas Badan POM sebagai upaya Efektivitas dan Efisiensi Sumber DayaLWT - Food Science and Technology, 41, 1344-1349. Note : Including reference sources from forms of integration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 65: Radiopharmacy and Chemotherapy

Radiopharmacy and Chemotherapy (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221515/Compulsory
Level	:	Undergraduate
Semester	:	5
Course Coordinator/Lecturer	:	1. Dr. Hilda Ismail, M.Si, Apt (Coordinator) 2. Dr. Fita Rahmawati, M.FRS, Apt 3. drh. Retno Murwanti, M.P., Ph.D. 4. Dr.rer.nat. Adam Hermawan, MSc., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using two methods: 1. Teacher-centered learning: the lecturer explains lecture material to students. 2. Team-based project: students work in groups on assignments accompanied by a supporting lecturer. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Basic Pharmaceutical Chemistry (FAF 221109) Pharmacotherapy (FAF 221403)
Course Learning Outcomes (CLO)	:	1. Understand the scope of radiopharmaceuticals and explain the dangers and benefits of radioactive substances in the world of pharmacy and medicine, their use for diagnostics, therapy and analysis. 2. Understand and explain the principles of radiopharmaceutical preparations and the quality control. 3. Understand and explain the pathophysiology, principles of cancer therapy and chemotherapy as well as the preparation of cytostatic drugs 4. Understand and explain pharmacotherapy evaluation for several types of cancer and the plan monitoring, information and education on drug therapy.
Description	:	This course studies the principles, preparation and quality control as well as the application of radiopharmaceuticals in disease diagnosis and therapy, introduction to cancer, the basics of administering chemotherapy, supportive therapy in cancer treatment, pathophysiology

		and therapeutic management of cervical, breast, leukemia and lymphoma cancers.
Examination Format/Assessment Methods	:	5% participatory activities, 35% project, 5% quiz, 25% midterm exam, 30% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Baum,S. and Bram,R. 1975, Basic Nuclear Medicine, Appleton-Century-Croft, New York. 2. Cember, H., 1983, Introduction to Health Physics, Second Editin, Pergamon Press Inc., New York. 3. Friedlander, G., et al, 1981, Nuclear and Radiochemistry, Third Edition, John Wiley and Sons Inc, New York.Knoll, G.F., 1979, Radiation Detection and Measurement, John Wiley & Sons, New York. 4. Leswara,N.D., 2005, Radiofarmasi, Buku ajar, Dep Farmasi, MIPA, UI, Jakarta. 5. Malcolme-Lawes, D.J., 1979, Introduction to Radiochemistry, First Edition, The Macmillan Press LTD, London. 6. Mc Kay, H. A. C., 1971, Principles of Radiochemistry, Butterworth & Co (Publishers) Ltd, London.Tsoulfanidis, N., 1983, Hemisphere Measurement and Detection of Radiation, Publishing Corporation, New York. 7. Watson, D.G., 1999, Pharmaceutical Analysis : A textbook for pharmacy students and pharmaceutical chemists, Churcill Livingston, UK. 8. Welch,M.J. and Redvanly,C.C, 2003, Hand book of Radiopharmaceuticals, Radiochemistry and Application, John Wiley & Sons Ltd, West Sussex, England. 9. Dipiro, J.T., Talbert, R.L., Yee G.C., Matzke G.R., Wells A.G., Posey L.M. 2008, Pharmacotherapy : A Pathophysiologic Approach, 7thEd, Appleton & Lange, Stamford. 10. Goodman & Gilman's, 1991, The Pharmacological basic of therapeutic, Mc Graw-Hill. 11. Herfindal, ET., Gourley, DR., 2000, Textbook of Therapeutics, Drug and Disease Management, 7th Ed., Lippincot & Williams, Philadelphia. 12. Koda-Kimble, M.A., Young, L.Y., Alldredge, B.K., Corelli,R.L., Guglielmo, B. J., Kradjan, W.A., Williams, B.R., 2009, Applied Therapeutics: The Clinical Use Of Drugs, 9th Ed, Lippincott Williams & Wilkins. 13. McPhee S.J. Hammer G.D., 2010, Pathophysiology of Disease : An Introduction to Clinical Medicine, 6rd Ed, The McGraw-Hill Companies Inc, New York. 14. Scwinghammer TL., 2002, Pharmacotherapy Casebook : A Patient Focused Approach, 5th Ed., McGraw-Hill, Pennsylvania.

15. Hermawan, A., R. A. Susidarti, R. D. Ramadani, L. Qodria, R. Y. Utomo, M. Ishimura, Y. Hattori, Y. Ohta, M. Kirihata, and E. Meiyanto. 2019. Cellular uptake evaluation of pentagamaboronon-0 (PGB-0) for boron neutron capture therapy (BNCT) against breast cancer cells, Invest New Drugs, 37:1292-99.
16. The latest scientific journal

Note : Including reference sources from forms of integration of Research and/or Community Service into courses

Date of last amendment: 8 August 2022

Module 67: Pharmaceutical Biotechnology

Pharmaceutical Biotechnology (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221603/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Dr. apt. Muthi' Ikawati, M.Sc. (Coordinator) Dr. apt. Riris Istighfari Jenie, M.Si. apt. Purwanto, M.Sc., Ph.D. apt. Setyowati Triastuti Utami, M.Sc., Ph.D.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Flipped learning, students study materials individually uploaded to eLOK 2. Lecturer Tutorial 3. Student-center learning (SCL): project-based learning (team-based project, TBP) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Molecular Biology (FAF 221201)
Course Learning Outcomes (CLO)	:	1. Students are able to explain the basic concepts (understanding) of pharmaceutical biotechnology and its applications for molecular disease detection and therapeutic development using biotechnology products 2. Students are able to understand the principles of genetic engineering (recombination of DNA) in plants and animals for the production of biopharmaceutics 3. Students are able to apply secondary metabolite production processes with genetic engineering techniques 4. Students are able to apply the basic principles of genetic engineering in the production of antibodies, vaccines, engineering proteins, and biosimilars

		5. Students are able to interpret (evaluate) the latest results of pharmaceutical biotechnology research from related scientific articles
Description	:	The pharmaceutical biotechnology course deals with applications of molecular biology in pharmaceuticals that include: (1) biopharmaceutical production including therapeutic proteins, antibodies, vaccines with genetic engineering techniques in animals or plants; protein and biosmiliary engineering; as well as (2) secondary metabolite production with genetically engineered techniques, and (3) introduction of development therapies using biotech products, among other things immunotherapy, gene therapy, oligonucleotides, and stem cell therapy. Additionaly, this course also introduces regulation and bioethics in biotechnology.
Examination Format/Assessment Methods	:	50% participatory activities and project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Crommelin D.J.A. and Sindelar R.D. (Eds.), 2008, Pharmaceutical Biotechnology: An Introduction for Pharmacists and Pharmaceutical Scientists, 3rd Edition, Harwood Academic Publishers, Amsterdam. 2. Gad, S.C. (Ed.), 2007, Handbook of Pharmaceutical Biotechnology, John Wiley & Sons, Inc., Hoboken, New Jersey. 3. Kayser, O. and Warzecha, H. (Eds.), 2012, Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, 2nd Ed., Wiley-VCH Verlag & Co. KGaA, Weinheim, Germany. 4. Sambamurthy K. and Kar A., 2006, Pharmaceutical Biotechnology, New Age International Publ. India. 5. Walsh G., 2007, Pharmaceutical Biotechnology: Concepts and Applications, John Wiley & Sons Ltd., England. 6. Other related latest sources (internet dll) Additional : 1. Astuti, Puji, Leonore de Boer, Noelle-Anne Sunstrom, and Peter P Gray. 2005. 'Green Fluorescent Protein (Gfp), Suatu Signal Penanda Quantitatif Untuk Memonitor Proliferasi Sel', Indonesian Journal of Pharmacy: 169-73. 2. Kopp, Florian, Adam Hermawan, Prajakta Shirish Oak, Vijay Kumar Ulaganathan, Annika Herrmann, Nefertiti Elnikhely, Chitra Thakur, Zhiguang Xiao, Pjotr Knyazev, and Beyhan Ataseven. 2014. 'Sequential salinomycin treatment results in resistance formation through clonal selection of epithelial-like tumor cells', Translational oncology, 7: 702-11.

3. Romadhonsyah, Fitra, Baiq Maylinda Gemantari, Arief Nurrochmad, Subagus Wahyuono, and Puji Astuti. 2022. Antioxidant, cytotoxic activities and characterization of secondary metabolites of endophytic fungus Schizophyllum commune isolated from Coleus amboinicus (lour.) leaves, Research Journal of Pharmacy and Technology, 15: 357-64.
4. Santoso, Adi, Septisetyani; Endah Puji, Meiyanto; Edy, Putri; Dyaningtyas Dewi Pamungkas, and Ratih Asmana Ningrum. 2014. 'Expression Of Modified Recombinant Human Erythropoietin In CHO-K1 Cells And Its In Vitro Proliferation Assay In TF-1 Cells', Indonesian Journal of Pharmacy, 25: 9-16.
5. Purwanto, Ratmoyo, Kentaro Hori, Yasuyuki Yamada, and Fumihiko Sato. 2017. Unraveling additional O-methylation steps in benzylisoquinoline alkaloid biosynthesis in California poppy (Eschscholzia californica', Plant and Cell Physiology, 58: 1528-40.
6. Ikawati Muthi. 2011. Enhancing International Collaboration in Pharmaceutical Education and Research: Vaccine Development: Monoclonal Antibody Production, Report, I-MHERE, Faculty of Pharmacy UGM, Yogyakarta.
7. Other related latest sources (artikel ilmiah dari jurnal bereputasi internasional)

Note : Includes reference sources from the integration form of Research and/or PKM into the course

Date of last amendment: 8 August 2022

Module 68: Good Manufacturing Practices

Good Manufacturing Practices (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221604/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Dr. T.N. Saifullah Sulaiman, M.Si., Apt. (Coordinator) Dr. Eng. apt. Khadijah, M.Si. Farida Nur Aziza, S. Farm., M.GMP., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Face-to-face lectures and discussions 2. eLOK 3. Presentation of project results 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Technology and Formulation of Solid Preparations (FAF 221304) Technology and Formulation of Liquid-Semi Solid Preparations (FAF 221404)
Course Learning Outcomes (CLO)	:	1. Students are able to show the relationship between quality system, personnel, buildings and facilities, equipment, production, and storage & delivery of drugs in the fulfillment of GMP 2. Students are able to apply the concept of quality control, self-inspection, as well as handling complaints & product recalls in accordance with GMP 3. Students are able to apply the concepts of documentation, outsourcing activities, and qualification & validation according to GMP
Description	:	The GMP course contains dynamic GMP, the manufacture of qualified drugs with reference to the quality system, personnel, buildings and facilities, equipment, production, how to store and deliver good drugs, quality control, self-inspection, handling of drugs, quality control. storage and delivery, quality control, self-inspection, handling complaints and

		product recalls, documentation, outsourcing activities (manufacturing under contract), quality control, self-inspection, handling complaints and product recalls, documentation, outsourcing activities (contract manufacturing), and qualification and validation.
Examination Format/Assessment Methods	:	20% participatory activities, 30% project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Anonim, 2018, Cara Pembuatan Obat yang Baik, Badan POM, Jakarta 2. Schlindwein, W.A., and Gibson, M, 2018, Pharmaceutical Quality by Design, Hobeken, USA Additional : 1. Anonim, 2012, Cara Pembuatan Obat yang Baik, Badan POM, Jakarta 2. PIC/S, 2018, Guide to Good Manufacturing Practice for Medicinal Products Note : Includes reference sources from the integration form of Research and/or PKM into the course

Date of last amendment: 8 August 2022

Module 69 : Pharmacoeconomics

Pharmacoeconomics (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221605/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Dr. Dwi Endarti, M.Sc., Apt (Coordinator) Prof. Dr. Satibi, M.Si, Apt Dr. Susi Ari Kristina, M.Kes, Apt Dr. Tri Murti Andayani, Sp.FRS., Apt
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacotherapy I (FAF 221403)
Course Learning Outcomes (CLO)	:	1. Mastering the principles of pharmacoeconomics to optimize therapy and cost calculation in pharmacoeconomics 2. Mastering the principles of outcome measurement in pharmacoeconomics 3. Mastering pharmacoeconomic research design to solve problems related to aspects of efficacy, safety, and cost of pharmaceutical preparations to optimize therapy 4. Understand pharmacoeconomics with approaches and modeling and master the interpretation and implementation of the results of pharmacoeconomic studies to optimize therapy.
Description	:	The Pharmacoeconomics course contains topics on the introduction to the discipline of pharmacoeconomics, various methods of pharmacoeconomic studies (Cost of Illness, Cost-minimization analysis, Cost-effectiveness analysis, Cost-Benefit analysis, Cost-utility analysis), how to measure costs

		and outcomes (clinical, economic and humanistic) in pharmacoeconomic studies. humanistic) in pharmacoeconomic studies, model-based pharmacoeconomic study approaches, interpretation and implementation of pharmacoeconomic study results.
Examination Format/Assessment Methods	:	40% participatory activities and project, 30% midterm exam, 30% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Drummond MF, Sculpher MJ, Claxton K, Stoddart GL, Torrance GW. Methods for the economic evaluation of health care programmes. Oxford university press; 2015 Sep 25. 2. Walters SJ. Quality of life outcomes in clinical trials and health-care evaluation: a practical guide to analysis and interpretation. John Wiley & Sons; 2009 Sep 10. 3. Edlin R, McCabe C, Hulme C, Hall P, Wright J. Cost effectiveness modelling for health technology assessment. Heidelberg: Springer; 2015. Additional : 1. Bootman JL., Townsend RJ., McGhan WF. 2015, Principles of Pharmacoeconomics, 3rdEd, Harvey Whitney Books Company, Cincinnati 2. Walley T., Haycox A., Boland A. 2004, Pharmacoeconomics, Churchill Livingstone, Philadelphia 3. Rascati KL. 2009, Essentials of Pharmacoeconomics, Lippincott Williams and Wilkins, Philadelphia 4. Rychlik R. 2002, Strategies in Pharmacoeconomics and Outcomes Research, Pharmaceutical Product Press, New York 5. Vogenberg FR. 2001, Introduction to Applied Pharmacoeconomics, Mc Graw-Hill Companies, USA

Date of last amendment: 8 August 2022

Module 70 : Pharmacotherapy III

Pharmacotherapy III (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221605/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Prof. Dr. apt. Djoko Wahyono, SU. Prof. Dr. apt. Zullies Ikawati Dr. apt. Fita Rahmawati, Sp.FRS. Dr. apt. Tri Murti Andayani, Sp.FRS. Dr. apt. Nanang Munif Yasin, M.Pharm. (Coordinator) apt. Woro Harjaningsih, Sp.FRS. apt. Fivy Kurniawati, M.Sc. apt. Mawardi Ihsan, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial 2. Discussion 3. Project-based learning/PBL (Team-based Project) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacotherapy II (FAF 221507)
Course Learning Outcomes (CLO)	:	1. Students are able to understand pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of drugs, as well as providing information and education in patients with renal disorders 2. Students are able to understand pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of drugs, as well as providing information and education in patients with special diseases 3. Students are able to understand pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of

		drugs, as well as providing information and education in patients with special diseases 4. Students are able to understand the pathophysiology, pharmacotherapy, monitoring the effectiveness and side effects of drugs, as well as providing information and education in patients with neurological disorders 5. Students are able to understand the principles of therapy in special population patients
Description	:	The course "Pharmacotherapy III" studies the therapeutic management of electrolyte and acid-base balance disorders, acute kidney injury (AKI) and drug-induced renal disease, chronic kidney disease (CKD), complications of chronic kidney disease, anemia, benign prostate hyperplasia (BPH), systemic lupus hyperplasia (BPH). chronic kidney disease, anemia, benign prostate hyperplasia (BPH), systemic lupus erythematosus (SLE), epilepsy, Parkinson's disease, anxiety and depression, schizophrenia and bipolar disorder, as well as therapeutic principles in pediatric and geriatric patients. pediatrics and geriatrics, pregnant and lactating, and with renal and hepatic dysfunction.
Examination Format/Assessment Methods	:	30% participatory activities and project, 35% midterm exam, 35% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Dipiro, J.T., et al. 2011, Pharmacotherapy: A Pathophysiologic Approach, 8th Ed, McGraw-Hill, New York Additional : 1. Alldredge, B.K., et al., 2013, Koda-Kimble & Young's Applied Therapeutics: The Clinical Use Of Drugs, 10th Ed, Lippincott Williams & Wilkins, Philadelphia 2. Brunton, L.L., et al. 2012, Goodman & Gilman's The Pharmacological basic of therapeutic, 12th Ed, McGraw-Hill, New York 3. Helms, R.A., et al. 2006, Textbook of Therapeutics, Drug and Disease Management, 8th Ed., Lippincot & Williams, Philadelphia 4. Scwinghammer, T.L. & Koehler, J.M., 2009, Pharmacotherapy Casebook: A Patient Focused Approach, 7th Ed., McGraw-Hill, New York

Date of last amendment: 8 August 2022

Module 71 : Clinical Pharmacy

Clinical Pharmacy (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221605/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Prof. Dr. apt. Tri Murti Andayani, Sp.FRS. (Coordinator) Prof. Dr. apt. Zullies Ikawati Dr. apt. Fita Rahmawati, Sp.FRS. Dr. apt. Nanang Munif Yasin, M.Pharm. apt. Woro Harjaningsih, Sp.FRS. apt. Arief Rahman hakim, S.Si., M.Si apt. Maya Ramadhani Indarto, S.Farm., M.Clin.Pharm apt. Firdhani Satia Primasari, S.Farm., M.Clin.Pharm apt. Anggraeni Citra RB., S.Farm. M.Clin.Pharm apt. Taufiqurohman, S.Farm., M.Clin.Pharm
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Case-based Learning, where students will be divided into several groups, then given one case of a particular disease to be solved together. The resolution of the case will be made in the form of a short report and presented in front of lecturers and other students in the course. 3. Presentations and discussions, where students will present the results of the case analysis given 50 minutes per week for 14 weeks in one semester
Workload	:	50 minutes of in-class lectures 60 minutes of structured assignment activities 60 minutes of independent activities In total 170 minutes/week In 16 weeks = 2720 minutes = 45.335 hours 1 ECTS = 28 hours
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmacotherapy I (FAF 221403)
Course Learning Outcomes (CLO)	:	1. Able to explore patient history to identify problems related to the efficacy and safety of pharmaceutical preparations 2. Able to search scientific literature and critical appraisal to optimize therapy

		3. Able to identify and solve problems related to the efficacy and safety of pharmaceutical preparations in rheumatology, endocrinology, and gastrointestinal cases 4. Able to identify and solve problems related to the efficacy and safety of pharmaceutical preparations in cardiovascular and respiratory cases 5. Able to dispensing aseptic preparations and IV admixture appropriately to optimize therapy
Description	:	This course studies how to dig patient history, search evidence-based medicine literature, critical appraisal, and pharmaceutical care in rheumatology, endocrinology, gastrointestinal, cardiovascular, respiratory, and dispensing aseptic preparations and IV admixture.
Examination Format/Assessment Methods	:	10% participatory activities, 50% case study, 10% midterm exam, 30% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : Dipiro, J.T., et al. 2011, Pharmacotherapy: A Pathophysiologic Approach, 8th Ed, McGraw-Hill, New York Additional : 1. A Annafiatuzakiah, F Rahmawati, 2023, Drug Related Problems in Geriatric Inpatients with Ischemic Stroke at Bhayangkara Anton Soedjarwo Hospital Pontianak, Journal of Health, Vol. 1(5), p.733-745 2. Alldredge, B.K., et al., 2013, Koda-Kimble & Young's Applied Therapeutics: The Clinical Use of Drugs, 10th Ed, Lippincott Williams & Wilkins, Philadelphia 4. Brunton, L.L., et al. 2012, Goodman & Gilman's The Pharmacological basic of therapeutic, 12th Ed, McGraw-Hill, New York 3. Scwinghammer, T.L. & Koehler, J.M., 2009, Pharmacotherapy Casebook: A Patient Focused Approach, 7th Ed., McGraw-Hill, New York

Date of last amendment: 8 August 2022

Module 72 : Phytotherapy

Phytotherapy (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221608/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Dr. rer. nat. Nanang Fakhrudin, M.Si., Apt. (Coordinator) Prof. Dr. Triana Hertiani, M.Si. Apt. Prof. Dr. Erna Prawita, S., M.Si., Apt. Dr. Indah Purwantini, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Case-based learning / PBL / other SCL methods, students will be given real problems in society, then asked to identify the root of the problem and try to find a solution (in accordance with the exposure in the lecture) 4. Project-based learning (Team-based Project), where students will be divided into several groups, then given a task to be completed together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacology II (FAF 221303) Pharmacotherapy I (FAF 221403)
Course Learning Outcomes (CLO)	:	1. Students are able to apply applicable regulations or laws applicable regulations or laws in solving problems related to the application of phytotherapy or traditional medicine development 2. Students are able to explain the selection of ingredients in the preparation of formula of traditional medicinal herbs

		3. Students are able to provide rational phytotherapy recommendations for respiratory, digestive, and excretory system disorders. 4. Students are able to provide rational phytotherapy recommendations for cancer diseases and phytotherapy for health maintenance, fitness, and vitality. 5. Students are able to provide rational phytotherapy recommendations for cardiovascular system disorders, diabetes mellitus, hyperlipidemia, and are able to explain the safety aspects of traditional medicine.
Description	:	The course is related to the treatment of diseases using natural materials (traditional medicine), especially medicinal plants. This course studies the definition, scope, history, development, basic concepts, and regulations in phytotherapy. In addition, it will also discuss the potential pharmaceutical interactions, pharmacodynamic and pharmacokinetic interactions, phytotherapy interactions with synthetic drugs, efficacy claims and supporting data in phytotherapy preparations, and phytotherapy in the context of government programs such as herbal medicine scientification. Phytotherapy for diseases commonly suffered by Indonesian people, such as disorders of the digestive system, respiratory system, cardiovascular system, excretory system, diabetes, cancer, hypercholesterolemia, as well as phytotherapy for maintaining health, fitness, and vitality.
Examination Format/Assessment Methods	:	51% project, 15% quiz, 17% midterm exam, 17% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Anonim, 1997, Kodifikasi Perundangan Obat Tradisional, Ditjen POM, Depkes R.I, Jakarta 2. Mills, S. & Bone, K., 1999, Principles and practice of Phytotherapy, Churchill Livingstone, Edinburgh. 3. Schulz, V., Hansel, R., & Tyler, V.E, 1997, Rational Phytotherapy, Springer, Berlin. 4. Divya Vohora and SP Vohora, 2016, Safety Concerns for Herbal Drugs, CRC Press, Boca Raton 5. Williamson, E., Driver, S., Baxter, K., 2009, Stockley Herbal Medicines Interactions, Pharmaceutical Press, London. 6. Ebadi M., 2002, Pharmacodynamic basis of Herbal Medicine, CRC Press, Boca Raton, Florida 7. Awang, Dennis V. C. 2009, Tyler's herbs of choice: the therapeutic use of phytomedicinals, 3rd edition, CRC Press, New York. 8. Anonim, 2000, General guidelines for methodologies on research and evaluation of traditional medicine, WHO, Geneva

9. Cooper, R., Kronenberg, F. (Eds.), 2009, Botanical Medicine: From Bench To Bedside, Mary Ann Liebert, New York.
10. Benzie, I.F.F., Wachrel-Galor, S., (Eds.), 2011, Herbal medicine: biomolecular and clinical aspects, 2nd Ed, CRC Press, New York.

Additional :

1. Other relevant recent sources (scientific articles from internationally reputable journals)
2. Website: https://kanalpengetahuan.farmasi.ugm.ac.id/category/pusat-informasi-obat-tradisional/

Note : Includes reference sources from the integration form of Research and/or PKM into the course

Date of last amendment: 8 August 2022

Module 73 : Technology and Formulation of Sterile Preparations

Technology and Formulation of Sterile Preparations (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221609/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Dr. rer. nat. Ronny Martien, M.Si. (Coordinator) Dr. Eng. apt. Khadijah, M.Si. Farida Nur Aziza, S. Farm., M.GMP., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using combination of tutorials and Team Based Learning activities method 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Physical Pharmacy II (FAF 221108)
Course Learning Outcomes (CLO)	:	1. Students are able to explain the concepts and basics of formulation and technology of sterile preparations 2. Students are able to design sterile pharmaceutical preparation formulas and their packaging 3. Students are able to analyze the quality of sterile pharmaceutical preparations 4. Students are able to apply the concepts of formulation and technology in sterile preparations
Description	:	The course “Technology and Formulation of Sterile Preparations” contains material on introduction, sterile preparation requirements, carrier and solvent materials, packaging, sterilization, microbial inactivation, sterile preparation requirements, formulation and preparation of parenteral preparations, quality control, and sterile preparations. requirements, formulation and manufacture of parenteral preparations, quality control, and ophthalmic preparations. ophthalmic preparations.

Examination Format/Assessment Methods	:	25% participatory activities, 25% project, 10% quiz, 20% midterm exam, 20% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Alexander, T., Florence, A.T., & Siepmann, J., 2009, Modern Pharmaceutics: Basic Principles and System, Vol. 1, 5th Ed., Informa Healthcare, New York. 2. Alexander, T., Florence, A.T., & Siepmann, J., 2009, Modern Pharmaceutics: Applications and Advances, Vol. 2, 5th Ed., Informa Healthcare, New York. 3. Avis, K.E., Lachman, L., & Lieberman, H.A., 1992, Pharmaceutical Dosage Forms, Parenteral Medication, Vol. I, II & III, Marcel Dekkes Inc., New York. 4. Odum, J.N., 2004, Sterile Product Facility Design and Project Management, 2nd Ed., CRC Press, London. 5. Akers, M.J., 2010, Sterile Drug Products: Formulation, Packaging, Manufacturing and Quality, CRC Press 6. Klang, M.G., 2018, Sterile Preparation Formulation in Compounding Sterile Preparations, 4th Ed. Additional : 1. Niazi, K.S., 2009, Handbook of Pharmaceutical Manufacturing Formulations: Sterile Products, Vol. 6, 2nd Ed., Informa Healthcare Inc., USA. 2. USP 40, 2017, USP–NF General Chapter <797> Pharmaceutical Compounding — Sterile Preparations 3. USP 40, 2017, USP–NF General Chapter <660>, <661>, <661.1>, <661.2>, <1660>, <1661> — Containers 4. Farmakope Indonesia Edisi VI, 2020

Date of last amendment: 8 August 2022

Module 75 : Sterile Dosage Form Technology and Formulation

Sterile Dosage Form Technology and Formulation (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221610/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Dr. rer. nat. Ronny Martien, M.Si. (Coordinator) Dr. Eng. apt. Khadijah, M.Si. Farida Nur Aziza, S. Farm., M.GMP., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using combination of tutorials and Team Based Learning activities method 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Physical Pharmacy II (FAF 221108)
Course Learning Outcomes (CLO)	:	Students are able to apply the concepts of formulation and technology in sterile preparations
Description	:	The course “Sterile Dosage Form Technology and Formulationthesis” contains material about the introduction, sterile preparation requirements, carrier materials and solvents, packaging, sterilization, microbial inactivation, sterile preparation manufacturing requirements, formulation and manufacture of parenteral preparations, quality control, and ophthalmic preparations.
Examination Format/Assessment Methods	:	25% participatory activities, 40% project, 35% exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Alexander, T., Florence, A.T., & Siepmann, J., 2009, Modern Pharmaceutics: Basic Principles and System, Vol. 1, 5th Ed., Informa Healthcare, New York. 2. Alexander, T., Florence, A.T., & Siepmann, J., 2009, Modern Pharmaceutics: Applications and Advances, Vol. 2, 5th Ed., Informa Healthcare, New York. 3. Avis, K.E., Lachman, L., & Lieberman, H.A., 1992, Pharmaceutical Dosage Forms, Parenteral Medication, Vol. I, II & III, Marcel Dekkes Inc., New York. 4. Odum, J.N., 2004, Sterile Product Facility Design and Project Management, 2nd Ed., CRC Press, London.

5. Akers, M.J., 2010, Sterile Drug Products: Formulation, Packaging, Manufacturing and Quality, CRC Press
6. Klang, M.G., 2018, Sterile Preparation Formulation in Compounding Sterile Preparations, 4th Ed.

Additional :

1. Niazi, K.S., 2009, Handbook of Pharmaceutical Manufacturing Formulations: Sterile Products, Vol. 6, 2nd Ed., Informa Healthcare Inc., USA.
2. USP 40, 2017, USP–NF General Chapter <797> Pharmaceutical Compounding — Sterile Preparations
3. USP 40, 2017, USP–NF General Chapter <660>, <661>, <661.1>, <661.2>, <1660>, <1661> — Containers
4. Farmakope Indonesia Edisi VI, 2020

Date of last amendment: 8 August 2022

Module 76 : Extraction Technology of Natural Products Practical Work

Extraction Technology of Natural Products Practical Work (1 Credits/1.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221613/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Prof.Dr.rer.nat.apt. Dr. apt. Triana Hertiani, M.Si (Coordinator) Dr. apt. Andayana Puspitasari Gani, M.Si Dr.rer.nat. apt. Yosi Bayu Murti, M.Si. Dr.rer.nat. apt. Nanang Fakhrudin, M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using Team-Based Project (TBP) method 170 minutes per week for 14 weeks in one semester
Workload	:	170 minutes laboratory practice
Credits	:	1 Credits/1.6 ECTS
Prerequisites	:	Pharmacognosy - Phytochemistry (FAF 221505)
Course Learning Outcomes (CLO)	:	1. Students are able to apply the selection of appropriate raw materials for extraction 2. Students are able to carry out extraction and its further stages to obtain extracts as raw materials for formulations 3. Students are able to optimize extract production 4. Students are able to apply the principles of standardization of natural materials in extract production
Description	:	The course "Laboratory Practice in Extraction Technology of Natural Materials" studies the principles and stages of the production process starting from the preparation of raw materials, the extraction process to the preparation of extracts for the formulation of galenical preparations, the essential oil production process, and the standardization of both specific and non-specific parameters required.
Examination Format/Assessment Methods	:	60% participatory activities and project, 25% midterm exam, 15% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. List, P.. dan Schmidt, P., 1989. Phytopharmaceutical Technology. p. 99-105, CRC Press, Boston Gaedcke, F., Steinhoff, B., & Blasius,

H., 2003, Herbal Medicinal Products, Medpharm Scientific Publisher, Stuttgart.
2. Handa, S.S., Khanuja, S.P.S., Longo, G., Rakesh, D.D., 2008, Extraction Technologies for Medicinal and Aromatic Plants, Int. Centre for Science and High Technology, Italy
3. Kementrian Kesehatan Republik Indonesia, 2017, Farmakope Herbal Indonesia, Edisi II, Jakarta
4. Rostagno, M.A and Prado, J.M, 2013, Natural Product Extraction: Principles and Applications, Royal Society of Chemistry

Additional :

1. Bolton, S. dan Bon, C., 2004. Pharmaceutical Statistics: Practical and clinical applications. 4th., rev. and expanded ed. p. 308–337. M. Dekker, New York
2. Departemen Kesehatan Republik Indonesia, 2004, Monografi Ekstrak Tumbuhan Obat Indonesia, Departemen Kesehatan RI, Jakarta.
3. Volova, T.G., Mahapatra, D.K., Khanna, S., Haghi, A.K., 2021, Natural Products Chemistry: Biomedical and Pharmaceutical Phytochemistry, CRC Press, New York, USA.
4. Related scientific journals

Date of last amendment: 8 August 2022

Module 77 : Drug Delivery System

Drug Delivery System (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221611/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Dr. apt. Adhyatmika, M.Biotech. (Coordinator) Prof. Dr. apt. Abdul Karim Zulkarnain, M.Si. Dr. apt. Marlyn Dian Laksitorini, M.Sc. Dr.rer.nat. Ronny Martien, M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods : 1. Tutorials are delivered by lecturers face-to-face in class/online room. 2. Discussions are held at the end of each segment between students and lecturers, and between fellow students in groups face-to-face in class/online space. 3. Quizzes at the end of each Course Learning Outcomes (CLO) session as a learning evaluation. 4. Assignments in the form of cases/problems to be solved in groups. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Biopharmaceutics (FAF 221501)
Course Learning Outcomes (CLO)	:	1. Students are able to understand the influence of biopharmaceutics on successful drug delivery (membrane and biological structure, physicochemical properties, and mass transfer). 2. Students are able to understand the concept of conventional oral and intravenous drug delivery and its limitations. 3. Students are able to explain modified drug delivery strategies in solving conventional delivery problems (nano and micro technology-based particles, orally disintegrating tablets, enteric

		coatings, prodrugs, controlled release, nasal and pulmonary delivery, transdermal). 4. Students are able to explain macromolecule and biopharmaceutical delivery strategies (peptides/proteins and vaccines). biopharmaceuticals (peptides/proteins and vaccines).
Description	:	The course "Drug Delivery Systems" generally discusses aspects in the delivery process of pharmaceutically active compounds to reach their site of action in sufficient quantities in the body. These aspects include: (1) Biopharmaceutics influences on successful drug delivery (membrane and biological structures, physicochemical properties, and mass transfer), (2) Conventional oral and intravenous drug delivery and its limitations, (3) Modified drug delivery strategies in solving conventional delivery problems (nano- and micro-technology-based particles, orally disintegrating drugs, orally disintegrating drugs, orally disintegrating drugs, orally disintegrating drugs, orally dispersing drugs, orally dispersing drugs, orally disintegrating drugs, orally disintegrating drugs, etc.). and micro technology-based particles, orally disintegrating tablets, enteric coatings, prodrugs, controlled release, nasal and pulmonary delivery, transdermal and pulmonary delivery, transdermal), and (4) Macromolecular and biopharmaceutical delivery strategies (peptides/proteins and vaccines).
Examination Format/Assessment Methods	:	20% participatory activities, 40% project, 20% midterm exam, 20% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Mathiowitz, E., 1999, Encyclopedia of Controlled Drug Delivery, Vol. I, John Wiley & Sons, New York 2. Mathiowitz, E., 1999, Encyclopedia of Controlled Drug Delivery, Vol. II, John Wiley & Sons, New York. 3. Amiji, M.M. and Sandmann, B.J., 2003, Applied Physical Pharmacy, McGraw-Hill Medical Publishing Division, New York. 4. Bronaugh, R.L. dan Maibach, H.I., 1999, Percutaneous Absorption: Drugs-Cosmetics–Mechanisms–Methodology, Marcel Dekker, New York. 5. Roberts, M.S. dan Walters, K.A., 1998, Dermal Absorption and Toxicity Assessment, Marcel Dekker, New York. 6. Janoff, A.S., 1999, Liposomes Rational Design, Marcel Dekker, New York. 7. Park, K., Shalaby, W.S.W., Park, H., 1993, Biodegradable Hydrogels for Drug Delivery, Technomic Publishing, Lancaster. 8. Amidon, G.L., Lee, P.I., Topp, E.M., 2000, Transport Processes in Pharmaceutical Systems, Marcel Dekker, New York.

9. Sage, B. H.. Iontophoresis. In E. W. Smith and H. I. Maibach (eds.). Percutaneous Penetration Enhancer, CRC Press Inc., 1995. pp. 351-368.
10. Banga, A. K., Bose, S. and Ghosh, T. K.. Iontophoresis and electroporation: comparisons and contrasts. Int J Pharm 179:1-19 (1999)
11. Leboulanger, Fathi, B. M., Guy, R.H. and Begoñ˜a Delgado-Charro, M., Reverse Iontophoresis as a Noninvasive Tool for Lithium Monitoring and Pharmacokinetic Profiling, Pharm Res, 21:,1214-1222 (2004)
12. McAllister, D. V., Wang, P. M.,. Davis, S. P, Park, J.H., Canatella, P.J., Allen, M. G., and Prausnitz, M. R., Microfabricated needles for transdermal delivery of macromolecules and nanoparticles: Fabrication methods and transport studies, PNAS, 100: 13755–13760, (2003)
13. Groneberg, D. Witt A.,C., Wagner U., Chung K.F., and Fischer, A., Fundamentals of Pulmonary Drug Delivery, Respiratory Med, 197: 382-387 (2003)
14. Krishnamachari, Y. Geary, S.M., Lemke, C.D. ,Aliasger K. and Salem A.K., Nanoparticle Delivery Systems in Cancer Vaccines, Pharm Res 28:215–236 (2011)
15. Merkus, F.W.H.M., Verhoef, J.C., Marttin, E., Romeijn, S.G., van der Kuy, P.H.M., Hermens, W.A.J.J., and Schipper, N.G.M., Cyclodextrins in nasal drug delivery, Adv. Drug Delivery Rev., 36: 41-57 (1999)
16. O'Hagan, D.T. and Rappuoli, R., Novel Approaches to Vaccine Delivery, Pharm Res, 21, 1519-1530 (2004)

Additional :

1. Banker, G.S., and Rhodes, CT., 1996, Modern Pharmaceutics, Marcel Dekker Inc., New York.
2. Sinko, P.J., 2006, Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th Edition,Lippincott Williams & Wilkins, Philadelphia.

Date of last amendment: 8 August 2022

Module 78 : Extraction Technology of Natural Products

Extraction Technology of Natural Products (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221612/Compulsory
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	Prof.Dr.rer.nat.apt. Dr. apt. Triana Hertiani, M.Si (Coordinator) Dr. apt. Andayana Puspitasari Gani, M.Si Dr.rer.nat. apt. Yosi Bayu Murti, M.Si. Dr.rer.nat. apt. Nanang Fakhrudin, M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using Team-Based Project (TBP) method 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacognosy - Phytochemistry (FAF 221505)
Course Learning Outcomes (CLO)	:	1. Students are able to apply the selection of appropriate raw materials for extraction 2. Students are able to carry out extraction and its further stages to obtain extracts as raw materials for formulations 3. Students are able to optimize extract production 4. Students are able to apply the principles of standardization of natural materials in extract production
Description	:	The course "Extraction Technology of Natural Materials" studies the principles and stages of the production process starting from the preparation of raw materials, the extraction process to the preparation of extracts for the formulation of galenical preparations, the essential oil production process, and the standardization of both specific and non-specific parameters required.

Examination Format/Assessment Methods	:	60% participatory activities and project, 25% midterm exam, 15% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. List, P.. dan Schmidt, P., 1989. Phytopharmaceutical Technology. p. 99-105, CRC Press, Boston Gaedcke, F., Steinhoff, B., & Blasius, H., 2003, Herbal Medicinal Products, Medpharm Scientific Publisher, Stuttgart. 2. Handa, S.S., Khanuja, S.P.S., Longo, G., Rakesh, D.D., 2008, Extraction Technologies for Medicinal and Aromatic Plants, Int. Centre for Science and High Technology, Italy 3. Kementrian Kesehatan Republik Indonesia, 2017, Farmakope Herbal Indonesia, Edisi II, Jakarta 4. Rostagno, M.A and Prado, J.M, 2013, Natural Product Extraction: Principles and Applications, Royal Society of Chemistry Additional : 1. Bolton, S. dan Bon, C., 2004. Pharmaceutical Statistics: Practical and clinical applications. 4th., rev. and expanded ed. p. 308–337. M. Dekker, New York 2. Departemen Kesehatan Republik Indonesia, 2004, Monografi Ekstrak Tumbuhan Obat Indonesia, Departemen Kesehatan RI, Jakarta. 3. Volova, T.G., Mahapatra, D.K., Khanna, S., Haghi, A.K., 2021, Natural Products Chemistry: Biomedical and Pharmaceutical Phytochemistry, CRC Press, New York, USA. 4. Related scientific journals

Date of last amendment: 8 August 2022

Module 79: Health Care System

Health Care System (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221701/Compulsory
Level	:	Undergraduate
Semester	:	2
Course Coordinator/Lecturer	:	Anna Wahyuni Widayanti.,MPH.,Apt., PhD Prof. Dr. Susi Ari Kristina, M.Kes., Apt Dr. Dwi Endarti, M.Sc, Apt Dr. Chairun Wiedyaningsih, M.Kes., M.App.Sc., Apt
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: learning by method of Project Case-based Will be carried out using the method: Online face-to-face discussions, using the Learning Management System, group collaboration in completing tasks 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacoeconomics
Course Learning Outcomes (CLO)	:	1. Students are able to explain the concept of the health service system,health law in Indonesia and comparing systems health services in various countries 2. Students explain the health financing and insurance system; and able to analyze health technology assessment (HTA) along with pharmacoeconomic studies in the decision-making process health program 3. The student is able to discuss the role of health information systems in supporting the healthcare system and JKN (National Health Insurance) in Indonesia 4. Mahasiswa mampu menganalisis program-program Kesehatan masyarakat di Indonesia

Description	:	The course "National Health System" covers concepts of health service systems, characteristics of health service systems, comparisons of health service systems in various countries, health financing systems, the concept of universal insurance, national health organizations, an introduction to Health Technology Assessment (HTA), the role of HTA and the results of pharmacoeconomic studies in decision-making, the national formulary, the role of health information systems in JKN (National Health Insurance), and health programs in Indonesia.
Examination Format/Assessment Methods	:	10% Participative, 40% ProjectResults/Case Study Results/**PBL Result, 25 %** midterm exam, final exam 25%
Learning Media	:	Example: https://elok.ugm.ac.id/course/view.php?id=13409 In-person: 0% ; Online: 100%
Literature	:	Main: 1. Johnson, J.A. and Stoskopf, C.H., 2010. Comparative health systems: global perspectives. Jones & Bartlett Publishers. 2. Lovett-Scott, M. and Prather, M.F., 2012. Global Health Systems. Jones & Bartlett Publishers. 3. http://www.who.int/healthsystems/en/ 4. *Kemenkes RI., 2009. Sistem Kesehatan Nasional. Jakarta.* 5. Presidential Regulation of the Republic of Indonesia No. 28 of 2016 concerning the Third Amendment to Presidential Regulation No. 12 of 2013 regarding Health Insurance. 6. Banta, D., 2003. The development of health technology assessment. Health policy, 63(2),pp.121-132. 7. Drummond, M.F. and McGuire, A., 2001. Economic evaluation in health care: merging theory with practice. OUP Oxford 8. Richard Edlin, Christopher McCabe, Claire Hulme, Peter Hall, Judy Wright. 2015. Cost 9. Effectiveness Modelling for Health Technology Assessment: A Practical Course. Springer International Publishing, Switzerland 10. Levin, B. L., Hurd, P. D., & Hanson, A. (2007). Introduction to public health in pharmacy. Jones & Bartlett Publishers. 11. The regulation of the Minister of Health regarding the control of tuberculosis, HIV, malaria, and other communicable diseases. 12. Minister of Health Regulation on the Implementation of Vaccination and Guidelines for Vaccine Management in Health Facilities Addition 1. Yuliastuti, F., Andayani, T. M., Endarti, D., & Kristina, S. A. (2023). Breast, cervical, and lungcancer: A comparison of real

healthcare costs and INA-CBGs rates in the era of national health insurance. Pharmacy Practice, 21(1), 1-7.
2. Yusransyah, Y., Kristina, S. A., & Endarti, D. (2023). Cost effectiveness of cervical cancer prevention strategies in Indonesia. Pharmacy Practice, 21(2), 1-5.

Date of last amendment: 8 August 2022

Module 80: Pharmaceutical Industry

Pharmaceutical Industry (6 Credits/9.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221703/Compulsory option
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	1. Dr. apt. T.N. Saifullah S., M.Si. (Coordinator) 2. Prof. apt. Dr. Sudibyo Martono, M.S. 3. Dr.rer.nat. Tatang Irianti, M.Sc., apt 4. Dr.rer.nat. Yosi Bayu Murti, M.Si. apt. 5. Apt. Arief Rahman Hakim. M.Si. 6. Dr. Eng. Khadijah, M.Si., Apt
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using face-to-face learning method: opinion, in-class discussions, quizzes, FGDs, internships and reports 300 minutes per week for 14 weeks in one semester
Workload	:	300 minutes of in-class lectures 360 minutes of structured assignment activities 360 minutes of independent activities In total 1020 minutes/week In 16 weeks = 16320 minutes = 272.01 hours 1 ECTS = 28 hours
Credits	:	6 Credits/9.6 ECTS
Prerequisites	:	Have taken at least 110 credits
Course Learning Outcomes (CLO)	:	1. Students are able to develop quality pharmaceutical preparations 2. Students are able to develop quality testing methods for raw materials and finished good 3. Students are able to apply a quality assurance system to the entire process
Description	:	The elective course package "Industrial Pharmacy" is provided in the form of learning through lectures, discussions, internships, and FGDs. Overall, the Industrial Pharmacy Interest Option learns how to develop pharmaceutical and veterinary products along with aspects that must be considered in the manufacture of pharmaceutical preparations such as quality assurance, production management, PPIC management, technology manufacturing pharmaceutical preparations such as quality assurance, production management, PPIC management, process technology, process validation, development and FGDs. technology, process validation, development and validation of analytical methods,

		packaging technology, as well as criteria and procedures for the registration of pharmaceutical preparations. and procedures for registration of pharmaceutical and veterinary preparations.
Examination Format/Assessment Methods	:	50% participatory activities and project, 5% quizzes, 30% internships and reports, 15% FGD
Learning Media	:	
Literature	:	Primary : 1. Ahuja, S. and Rasmussen, H., 2007, HPLC method development for pharmaceuticals, vol.8, Separation science and technology, Elsevier, Academic Press, Amsterdam. 2. BPOM, 2018, Cara Pembuatan Obat yang Baik, Badan POM, Jakarta. 3. BPOM, 2017, Kriteria Dan Tata Laksana Registrasi Obat, Badan POM, Jakarta 4. Ermer, J. and Miller, J.H.M., 2005, Method validation in pharmaceutical analysis, A guide to best pactice, Wiley-VCH Verlag GmbH, Weinheim. 5. Huynh-Ba, K, (Ed.), 2009, Handbook of Stability Testing in Pharmaceutical Development: Regulations, Methodologies, and Best Practices, Springer. 6. Lang, J. C., 2010, Production and Inventory Management with Substitutions, Springer Verlag, Amsterdam 7. Miller, J.M. and Crowther, J.B., 2000, Analytical Chemistry in a GMP Environment, John Wiley & Sons, Inc., New York. 8. Nash, R. A., and Wachter, A. H., 2003, Pharmaceutical Process Validation, 3rd, Marcel Dekker Inc. Additional : Chan, C.C., Lam, H., Lee, Y.C., and Zhang, X.M., 2004, Analytical method validation and instrument performance verification, Wiley-Interscience, John Wiley & Sons Inc., Hoboken, New Jersey.

Date of last amendment: 8 August 2022

Module 81: Community Pharmacy and Regulatory

Community Pharmacy and Regulatory (6 Credits/9.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221704/Compulsory option
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	1. Dr. apt. Susi Ari Kristina, M. Kes. (Coordinator) 2. Dr. apt. Anna Wahyuni Widayanti, MPH. 3. Dr. apt. Tri Murti Andayani, SpFRS. 4. Dr. apt. Nanang Munif Yasin, M.Pharm. 5. Prof. Dr. apt. Satibi, M.Si 6. Apt. Hardika Aditama, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using face-to-face learning method: opinion, in-class discussions, quizzes, FGDs, internships and reports 300 minutes per week for 14 weeks in one semester
Workload	:	300 minutes of in-class lectures 360 minutes of structured assignment activities 360 minutes of independent activities In total 1020 minutes/week In 16 weeks = 16320 minutes = 272.01 hours 1 ECTS = 28 hours
Credits	:	6 Credits/9.6 ECTS
Prerequisites	:	Have taken at least 110 credits
Course Learning Outcomes (CLO)	:	1. Students are able to analyze pharmaceutical practice activities in the community with the principles of professionalism, ethics and morals, in accordance with their authority and responsibilities. 2. Students are able to make forms of health intervention in the community through the stages of need assessment, design intervention strategies, and evaluate the program. 3. Students are able to analyze drug management activities and clinical pharmacy services in pharmacies and health centers. 4. Students are able to analyze policy and regulatory issues in the community. and develop alternative solutions to these problems.
Description	:	The elective course package "Community Pharmacy and Regulation" discusses the principles of professionalism, ethics and morals, in accordance with the authority and responsibilities of pharmacists in pharmaceutical services; planning and design of health interventions in the community through the stages of need assessment, intervention

		strategies, and evaluation of the program; drug management skills and clinical pharmacy services in pharmacies and health centers are also provided in this course. In the final stage, policy and regulatory issues in the community are introduced and alternative solutions to these issues are examined using policy evaluation methods.
Examination Format/Assessment Methods	:	55% participatory activities and project, 5% quizzes, 20% midterm exam, 20% final exam
Learning Media	:	
Literature	:	Primary : 1. Permenkes no 73 Tahun 2016 tentang Standar Pelayanan Kefarmasian di Apotek 2. Auta A, Hadi MA, Oga E, Adewuyi E, Abdu-Aguye SN, Adeloye D, et al. Global access to antibiotics without prescription in community pharmacies: A systematic review and meta-analysis. J Infect Public Health. 2019;78(1):8-18. 3. Le Grand A, Hogerzeil HV, Haaijer-Ruskamp FM. Intervention Research in Rational Use of Drugs: A Review. Health Policy and Planning. 1999;14(2):89-102. 4. World Health Organization. How to Investigate Drug Use in Health Facilities: Selected Drug Use Indicators. Geneva: WHO, 1993. 5. World Health Organization, Health Action International. Measuring Medicine Prices,Availability, Affordability and Price Components Geneva: WHO; 2008.

Date of last amendment: 8 August 2022

Module 83: Cosmetics and Food

Cosmetics and Food (6 Credits/9.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221706/Compulsory option
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	1. Prof. Dr.rer.nat. apt. Raden Rara Endang Lukitaningsih, M.Si. 2. Prof. Dr. apt. Erna Prawita Setyowati, M.Si. 3. Prof. Dr. Abdul Rohman, M.Si., Apt. 4. Prof. Dr. apt. Arief Nurrochmad, M.Si., M.Sc. 5. Prof. Dr. apt. Akhmad Kharis Nugroho, M.Si. 6. Prof. Dr. apt. Abdul Karim Zulkarnain, M.Si.,SE. 7. apt. Rumiyati, M.Si., Ph.D. (Coordinator) 8. apt. Purwanto, M.Sc., Ph.D. 9. Dr. Eng. apt. Khadijah, M.Si. 10. apt. Halida Rahmania, PhD.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorials and discussions, where students will listen to the lecturer's explanation and discuss related material problems given. 2. Webinars by inviting speakers from related institutions such as the cosmetics industry, food industry, BPOM, and other practitioners related to lecture topics 3. Case-based Project-based learning, where students are given a topic in the development of development of cosmetics or food products and the results are presented in front of lecturers and other students. lecturers and other students. 300 minutes per week for 14 weeks in one semester
Workload	:	300 minutes of in-class lectures 360 minutes of structured assignment activities 360 minutes of independent activities In total 1020 minutes/week In 16 weeks = 16320 minutes = 272.01 hours 1 ECTS = 28 hours
Credits	:	6 Credits/9.6 ECTS
Prerequisites	:	Have taken at least 110 credits
Course Learning Outcomes (CLO)	:	1. Students are able to explain the concepts of cosmetics, nutraceuticals and food and apply modern technology in the development of cosmetics, nutraceuticals and food 2. Students are able to evaluate the efficacy and safety of cosmetics, nutraceuticals and foods

		3. Students are able to solve the given case (miniproject) related to the development of cosmetics, nutraceuticals and food.
Description	:	The elective package course "Cosmetics and Food" discusses the science of cosmetology and nutrasetics, the function and physiology of the skin, the function of cosmetics and nutrasetics, regulations and rules for notification of cosmetic products and registration of food products, how to make cosmetics and food starting from the selection of raw materials, formulations, technology and process validation, etiquette and packaging as well as quality assurance procedures for cosmetics and food products and the utilization of natural resources for cosmetics, nutrasetics, and food.
Examination Format/Assessment Methods	:	10% participatory activities, 40% project, 25% midterm exam, 25% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Betton, C.I., 2007, Global regulatory issues for the Cosmetics Industry, Vol 1, William Andrew Inc. 2. Rogiers, V. and Pauwels, M., 2008, Safety Assessment of Cosmetics in Europe, Karge A.G., Switzerland 3. Salvador, A. and Chisvert, A., 2007, Analysis of Cosmetic Products, Elsevier, Amsterdam 4. Shaath, N.A., 2005, Sunscreen-regulation and cosmetics, 3rd edition, Taylor & Francis Co. 5. Tonnesen, H.H., 1996, Photostability of Drugs and Drug Formulations, Taylor & Francis Co. 6. Chilcott, R.P., Price, S., 2008, Principle and practice of Skin Toxicology, John Wiley and Sons, USA 7. Selamat, J & Iqbal, S.Z, 2016, Food Safety, Basic Concepts, Recent Issues and Future Challenges, Springer, Additional : 1. Lily Arsanti Lestari, Abdul Rohman, Irnawati, 2022, Analysis of lard, chicken fat and beef fat in ternary mixture using FTIR spectroscopy and multivariate calibration for halal authentication, Food Research 2. Raden Rara Endang Lukitaningsih, Sudjadi, Abdul Rohman, 2016, Analysis of Lard in Lipstick Formulation Using FTIR Spectroscopy and Multivariate Calibration: A Comparison of Three Extraction Methods.J. Oleo Sci Note : Includes reference sources from the integration form of Research and/or PKM into the course

Date of last amendment: 8 August 2022

Module 84: Distribution and Marketing Management

Distribution and Marketing Management (6 Credits/9.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221707/Compulsory option
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	1. Prof. Dr. Satibi, M.Si., Apt. (Coordinator) 2. Dr. Dwi Endarti, M.Sc., Apt. 3. Dr. Bondan Ardiningtyas, M.Sc., Apt. 4. Dr. Anna Wahyun W, M.PH, Apt. 5. Dr. T.N. Saifullah, M.Si., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem. 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given a task to be completed together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course. 4. Case-based learning / PBL / other SCL methods, students will be given real problems in society, then asked to identify the root of the problem and try to find a solution (in accordance with the exposure in the lecture). 300 minutes per week for 14 weeks in one semester
Workload	:	300 minutes of in-class lectures 360 minutes of structured assignment activities 360 minutes of independent activities In total 1020 minutes/week In 16 weeks = 16320 minutes = 272.01 hours 1 ECTS = 28 hours
Credits	:	6 Credits/9.6 ECTS
Prerequisites	:	Have taken at least 110 credits
Course Learning Outcomes (CLO)	:	1. Able to evaluate good drug distribution methods in distribution facilities 2. Able to develop marketing plans for pharmaceutical preparations and medical devices 3. Able to compare distribution and marketing practices in terms of ethical and legal aspects 4. Able to solve problems in the distribution and marketing of pharmaceutical preparations and medical devices

		5. Able to build communication with partners in the distribution and marketing of pharmaceutical preparations and medical devices
Description	:	The elective package course "Distribution and Marketing Management" is provided in the form of learning through lectures, internships, and comprehensive discussions. Overall, pharmaceutical distribution and marketing management discusses an introduction to drug distribution management and regulation, CDOB, process management and risk management in distribution, marketing concepts of pharmaceutical products, delivering and communicating value, strategic marketing management.
Examination Format/Assessment Methods	:	60% participatory activities and project, 20% midterm exam, 20% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Pedoman Teknis Cara Distribusi Obat yang Baik 2. Kotler, P., Keller, K.L, 2012, Marketing Management 14 Ed, Prentice Hall 3. Porter, ME., 2007, Strategi Bersaing (terjemahan), Karisma Publishing Group 4. Wheelen, TL., dan Hunger, JD., 2010, Strategic Management and Business Policy, 12 Ed, Pearson

Date of last amendment: 8 August 2022

Module 85: Traditional Medicine

Traditional Medicine (6 Credits/9.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221708/Compulsory option
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	1. Dr.apt. Andayana Puspitasari Gani, M.Si (Coordinator) 2. Prof. Dr.rer.nat. apt. Triana Hertiani, M.Si. 3. Prof. Dr. apt A. Karim Zulkarnaen, M.Si 4. Dr.rer.nat.apt. Yosi bayu Murti, M.Si
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using SCL-Team-Based Project (TBP) method 300 minutes per week for 14 weeks in one semester
Workload	:	300 minutes of in-class lectures 360 minutes of structured assignment activities 360 minutes of independent activities In total 1020 minutes/week In 16 weeks = 16320 minutes = 272.01 hours 1 ECTS = 28 hours
Credits	:	6 Credits/9.6 ECTS
Prerequisites	:	Have taken at least 110 credits
Course Learning Outcomes (CLO)	:	1. Students are able to apply the principles of traditional medicine preparation development 2. Students are able to produce traditional medicine preparation designs 3. Students are able to produce a design of a quality assurance system for traditional medicinal preparations 4. Able to demonstrate/illustrate the registration process of traditional medicinal preparations
Description	:	The elective package course "Traditional Medicine" discusses the scope of traditional medicine product design, ranging from new product development, production processes, quality assurance to product registration. The product development module discusses how new designs are made, market analysis, Good Manufacturing Practices (GMP) and related regulations. In the product module, the discussion emphasizes the selection of raw materials, composition, formulation, extraction

		technology, and packaging. In the quality assurance module, it discusses the implementation of a quality assurance system in the traditional medicine industry, GMP implementation, identification of raw materials to analysis of active ingredients in traditional medicine products. In this course package, the procedures for registration of traditional medicine products are also studied.
Examination Format/Assessment Methods	:	70% participatory activities and project, 30% exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Peraturan Kepala Badan POM No.25 tahun 2021 tentang Penerapan CPOTB 2. Keputusan Kepala Badan POM No. HK. 00.05.41.1384 tahun 2005 tentang Kriteria dan Tata Laksana Pendaftaran Obat Tradisional, Obat Herbal Terstandard, dan Fitofarmaka 3. Peraturan Badan POM No. 32 tahun 2019 tentang Persyaratan Mutu Keamanan dan Mutu Obat Tradisional 4. Swarbrick, J. (Ed.), 2007, Encyclopedia of Pharmaceutical Technology 3rd, Informa Healthcare Inc 5. Banker, G.S. & Rhodes, C.T., 2002, Modern Pharmaceutics, 4th Ed., Marcel Dekker Inc., New York. 6. DepKes Ri, 2000, Parameter Standar Umum Ekstrak Tumbuhan Obat, DepKes RI

Date of last amendment: 8 August 2022

Module 86: Research and Drug Discovery

Research and Drug Discovery (6 Credits/9.6 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAF 221709/Compulsory option
Level	:	Undergraduate
Semester	:	6
Course Coordinator/Lecturer	:	1. Prof. Dr. Ritmaleni, S.Si. (Coordinator) 2. Dr.rer.nat. Apt. Nanang Fakhrudin, M.Si. 3. Prof. Dr. Apt. Akhmad Kharis Nugroho, M.Si. 4. Adhyatmika, Apt., M.Biotech., Ph.D. 5. Apt. Sisca Ucche, S.Farm., M.Pharm.Sc., Ph.D. 6. Prof. Dr. apt. Agung Endro Nugroho, S.Si., M.Si. 7. Dr. Apt. Riris Istighfari Jenie, M.Sc. 8. Dr. Djoko Santoso, M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be conducted using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem a problem 3. Guest lecture, where students get research experience from guest lecturers 4. Projects, where students complete structured projects and optional projects related to research 5. drug discovery 300 minutes per week for 14 weeks in one semester
Workload	:	300 minutes of in-class lectures 360 minutes of structured assignment activities 360 minutes of independent activities In total 1020 minutes/week In 16 weeks = 16320 minutes = 272.01 hours 1 ECTS = 28 hours
Credits	:	6 Credits/9.6 ECTS
Prerequisites	:	Have taken at least 110 credits
Course Learning Outcomes (CLO)	:	1. Students are able to analyze basic theoretical concepts about research 2. and discovery of synthetic drugs, natural materials and macromolecules. 3. Students are able to analyze the basic concepts of theory about in vitro and in vivo tests in drug research and discovery.

		4. Students are able to analyze the basic concepts of theory about pre-formulation aspects of drug research and discovery. 5. Students are able to apply the basic concepts of the theory of research and drug discovery
Description	:	The elective package course "Research and Drug Discovery" studies the basic concepts of synthetic drugs, natural materials and macromolecules ranging from design, isolation, characterization of in vitro tests, in vivo tests as well as the concept of pre-formulation and its application to the drug research and discovery process.
Examination Format/Assessment Methods	:	50% participatory activities and project, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Bulugahapitiya VP., 2018, Plants Based Natural products : Extraction, Isolation and Phytochemical screening methods, Indika Graphics Matara, Sri Langka 2. Gibson M, 2009, Pharmaceutical preformulation and formulation: A practical guide from candidate drug selection to commercial dosage form, 2nd Edition, CRC Press. 3. Grotewold E. (Ed.), 2014, The Science of Flavonoids, Springer, Columbus, Ohio, USA. Note : (Erich Grotewold Department of Cellular and Molecular Biology The Ohio State University Columbus, Ohio 43210 USA grotewold.1@osu.edu) 4. Kayser, O. and Warzecha, H. (Eds.), 2012, Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, 2nd Ed., Wiley-VCH Verlag & Co. KGaA , Weinheim, Germany. Additional : 1. Acharya PC, Shetty S, Fernandes C, Suares D, Maheshwari R, and Tekade RK, 2018, Chapter 1 – Preformulation in drug research and pharmaceutical product development, Academic Press. 2. Clayden et al., 2012, Organic Chemistry 3. Niazi SK, 2019, Handbook of preformulation: Chemical, biological, and botanical drugs, 2nd edition, CRC Press 4. Niazi SK, 2007, Handbook of preformulation: Chemical, biological, and botanical drugs, 1st edition, CRC Press 5. Patrick G., 2001, Instant Notes : Medicinal Chemistry, pp. 75-82, BIOS Scientific Publishers Ltd., 9 Newtec Place, Magdalen Road, Oxford OX4 1RE, UK 6. Raks V., Al-Suod H., and Buszewski B., 2018, Isolation, Separation, and Preconcentration of Biologically Active Compounds from Plant Matrices by Extraction Techniques, Chromatographia, 81:189–202.

Date of last amendment: 8 August 2022

Module 87: Thesis

Thesis (6 Credits/9.6 ECTS)

Undergraduate thesis		
Code/Status	:	FAF 221801/Compulsory
Level	:	Undergraduate
Semester	:	8
Course Coordinator/Lecturer	:	Dr. Purwanto, M.Si., Apt. Muhammad Novrizal Abdi Sahid, M.Eng., Ph.D. Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: learning by method of Case-based learning/Project Will be carried out using the method: 1. Tutorial and Discussion, where students will listen to the lecturer's explanation and discuss issues related to the material provided 2. Case-based Project-based learning, where students will be given a case to be solved by team of student and the results will be presented in front of the lecturer and other students 1020 minutes per week for 14 weeks in one semester
Workload	:	1020 minutes per week for 14 weeks in one semester
Credits	:	6 Credits/9.6 ECTS
Prerequisites	:	1. Research Methods & Statistics in Pharmacy 2. Pharmaceutical Elective Course
Course Learning Outcomes (CLO)	:	1. Students are able to create research designs 2. Students are able to defend research designs 3. Students are able to carry out research designs 4. Students are able to interpret the research results obtained 5. Students are able to defend research results 6. Students are able to make written reports on scientific studies carried out by paying attention to the rules for implementing and writing scientific reports
Description	:	This course facilitates students to carry out experimental research activities, social research, and literature studies related to the pharmaceutical field. The aim is to provide a real picture of the application of the knowledge gained during college. Apart from that, students will also practice writing down ideas about problems that still need to be addressed, providing suggestions for solutions and conducting research to test whether the proposed solutions can provide the right solution. This course will train students to systematically do all of this through preparing proposals, defending their proposed proposals, conducting research/studies on problem solving, and defending the results of problem solving findings.

Examination Format/Assessment Methods	:	50% Participative, 50% ProjectResults/Case Study Results/**PBL Result**
Learning Media	:	All material related to the thesis carried out Offline and online percentages can be adjusted according to the type of thesis being worked on
Literature	:	1. Decree on the 2022 Undergraduate Study Program Curriculum 2. Academic guide for the Undergraduate Study Program in 2021 3. Final assignment writing guide in 2023

Date of last amendment: 8 August 2022

Module 94: Students Service Learning

Students ervice Learning(4 Credits/6,8 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	UNU 222001/Compulsory
Level	:	Undergraduate
Semester	:	VIII
Course Coordinator/Lecturer	:	all DPLs and the UGM KKN PPM Regional Coordinator who are assigned by the Rector's Decree, approximately 250 DPLs per year
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Team Based Project Learning, Case Based Method carried out over a period of 2 (two) months, with each student required to complete at least 288 (two hundred eighty-eight) effective working hours
Workload	:	carried out over a period of 2 (two) months, with each student required to complete at least 288 (two hundred eighty-eight) effective working hours
Credits	:	10 Credits/170 ECTS
Prerequisites	:	Has completed 100 credit hours without an E grade and is not currently enrolled in any courses
Course Learning Outcomes (CLO)	:	1.students Capable of applying methods to design and analyze community empowerment. 2.students Able to analyze and design empowerment programs 3.Capable of implementing empowerment programs based on local potential and wisdom 4.Able to compile program performance accountability reports accountability-based empowerment program
Description	:	**Students service Learning** at Gadjah Mada University is a mandatory course for students at Gadjah Mada University. It involves living with the community and carrying out interdisciplinary community empowerment activities. students Service Learning is part of the educational process at Gadjah Mada University with the aim of enhancing students' empathy and concern, implementing applied knowledge and technology, teamwork, and interdisciplinary approaches, instilling personal values, improving national competitiveness, and fostering a research-oriented mindset.
Examination Format/Assessment Methods	:	General tes 10%, Repot work plan 5 %, Implementation 30%, Disciplin 15 %, cooperation 15 %, Appreciation 10%, Implementation Report 5 %, response 10 %

Learning Media	:	https://elok.ugm.ac.id http://simaster.ugm.ac.id Luring: 95%; Daring: 5%
Literature	:	DPKM UGM. 2020. Guidebook for students Service Learning Program (KKN-PPM) Universitas Gadjah Mada. Yogyakarta

Date of last amendment: 8 August 2022

Module 97. Structure Elucidation

Structure Elucidation (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221001/elective
Level	:	Undergraduate

Semester	:	Minimum in semester 3
Course Coordinator/Lecturer	:	1. Prof. Dr. apt. Ratna Asmah Susidarti, M.S. (Koordinator) 2. Prof. Dr.rer.nat. apt. Raden Rara Endang Lukitaningsih, M.Si. 3. Prof. Dr. Ritmaleni 4. Dr. Artania Adnin Tri Suma, M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Tutorials, discussions/exercises, and assignments 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	
Course Learning Outcomes (CLO)	:	After completing this course, students are expected to be able to: 1. UV & IR Spectroscopy 2. Mass Spectroscopy 3. NMR Spectroscopy 4. NMR Spectroscopy
Description	:	The Structure Elucidation course discusses the basic problems of UV, IR, NMR spectroscopy, and mass spectroscopy for determining the chemical structure of a compound.
Examination Format/Assessment Methods	:	Project 60%, midterm exam 20%, final exam 20%
Learning Media	:	https://elok.ugm.ac.id Offline Course: 100 %
Literature	:	Main: 1. Pavia, D., Lampman, G.M., and Kriz, G.S., 2001, Introduction to Spectroscopy :A Guide for Student of Organic Chemistry, W.B. third ed., Sauders Company, London 2. Silverstein RM, Webster FX., 1998, Spectrometric Identification of Organic Compounds, 6th edition, John Wiley & Sons, New York 3. McLafferty FW., 1980, Interpretation of Mass Spectra, Mill Valey, University Science Books, California Addition :

4. 1. Williams, D.H., Fleming, I., 1995, Spectroscopic methods in Organic Chemistry, Fifth edition., McGraw-Hill, Maidenhead, Berkshire, England
5. Kemp,W., 1979, Organik Spectroscopy, The MacMillan Press Ltd, London
6. Synthesis and Anti-Inflammatory Activity of 1-(2,5-Dihydroxyphenyl)-3-Pyridine-2-Yl- Propenone (AEW-1) Compound, 2021, International Journal of Pharmacy, 32(2):209-220
7. Synthesis of Boron containing compound (CCB-2) based on curcumin structure and its cytotoxic effect against cancer cells, 2020, Journal of Applied Pharmaceutical Science, 10(2):060-066,

Date of last amendment: August 8th, 2022

Module 99. Marine Pharmaceuticals

Marine Pharmaceuticals (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	**:**	FAFP221003/elective

Level	:	Undergraduate
Semester	:	Minimum in semester 3
Course Coordinator/Lecturer	:	Prof. Dr. Erna Prawita Setyowati, MSi., Apt. (coord) Dr.rer.nat. Yosi Bayu Murti, MSi., Apt. Prof. Dr.rer.nat. Triana Hertiani, MSi., Apt.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given a task to be completed together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	FAF 2021
Course Learning Outcomes (CLO)	:	1. Students are able to explain the sources of efficacious substances and efficacious supporters that come from the sea. 2. Students are able to explain the diversity of structures, biosynthesis pathways, isolation and production strategies of natural compounds from the sea.
Description	:	This course is an elective course for students of the Pharmaceutical Science Study Program which provides knowledge about marine medicinal materials including marine biota including sources of natural materials for medicines, characteristics of marine natural compounds and their applications and general principles of extraction and isolation procedures for marine natural compounds, as well as strategies for the production of marine natural materials in the future.
Examination Format/Assessment Methods	:	Task/quiz 10%, midterm exam 45%, final exam 45%
Learning Media	:	https://elok.ugm.ac.id Offline Course: 90 %; Online: 10%, Project
Literature	:	Main:

	1. Bhakuni, D.S., and Rawat, D.S., 2005, *Bioactive Marine Natural Products*, Springer, USA 2. Fusetani, N., 2000, *Drugs From the Sea*, Karger 3. Scheper (Ed.), 2005, *Marine Biotechnology* I and II, Springer 4. Cannel R.J.P., 1998*, How to Approach the Isolation of a Natural Product. Natural Products Isolation*, Totowa: Humana Press 5. Paul M. Dewick, 2002, *Medicinal Natural Product A Biosynthetic Approach*, 2nd Ed., John Wiley and Sons, Ltd. Adddition: Other recent related sources (scientific articles from internationally reputable journals)

Date of last amendment: August 8th, 2022

Module 101. Drug Interactions

Drug Interactions (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	**:**	FAFP221004/elective

Level	:	Undergraduate
Semester	:	Minimum in semester 3
Course Coordinator/Lecturer	:	Dr. apt. Purwantiningsih, M.Si. (Coord) Dr. apt. Fita Rahmawati, Sp.FRS. apt. Arief Rahman Hakim, M.Si. apt. Dr. Soni Siswanto, M.Biomed
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Case-based learning and research-based learning 100 minutes per week for 14 weeks in one semester ..
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacology II
Course Learning Outcomes (CLO)	:	1. Able to explain the mechanism of pharmacodynamic interactions, pharmacokinetics, and principles of clinical management of drug interactions. 2. Able to explain the mechanism and management of drug interactions with food and drug interactions with herbs. 3. Able to explain the mechanism and management of parenteral preparation incompatibilities.
Description	:	This course begins with an overview and mechanism of drug interactions, followed by the mechanism of drug interactions in the absorption and distribution process, drug interactions in the metabolism and excretion process, pharmacodynamic interactions, drug interactions with food, drug interactions with herbs, clinical management of drug interactions, specific drug-drug interactions: mechanisms and management, and parenteral preparation incompatibilities.
Examination Format/Assessment Methods	:	Project 30%, midterm exam 35%, final exam 35%
Learning Media	:	https://elok.ugm.ac.id Offline Course: 90 %; Online: 10%
Literature	:	Main:

8. Baxter, K, 2011, Stockley's Drug Interactions, 9th Ed., Pharmaceutical Press.

Adddition:

9. Tatro, DS, 2015, Drug Interaction Facts, Facts and Comparison.
10. Mozayani, A dan Raymon, LP, 2004, Handbook of Drug Interactions, Humana Press, New Jersey.
11. Rodrigues, AD, 2002, Drug-drug Interactions, Taylor & Francis, New York.
12. Trissel, LA, 2009, Handbook on Injectable Drugs, 15th Ed., American Society of Health-System Pharmacists.
13. Gray, A et al., 2011, Injectable Drugs Guide, Pharmaceutical Press

Note : Including reference sources from the form of integration of Research and/or PkM into courses

Date of last amendment: August 8th, 2022

Module 104. Natural Corigen

Natural Corigen (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221007/elective
Level	:	Undergraduate
Semester	:	Minimum in semester 3
Course Coordinator/Lecturer	:	1. apt. Purwanto, M.Sc., Ph.D 2. Dr. Sylvia Utami TP, M.Si. 3. Dr. apt. Puguh Indrasetiawan, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Project-based learning (Team-based Project/case-based learning/PBL) 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	
Course Learning Outcomes (CLO)	:	1. Students are able to explain the applicable guidelines and regulations regarding the use of natural additives in pharmaceutical preparations. 2. Students are able to analyze and apply natural aroma substances in pharmaceutical preparations. 3. Students are able to analyze and apply natural flavoring substances in pharmaceutical preparations. 4. Students are able to analyze and apply natural coloring agents in pharmaceutical preparations.
Description	:	This course discusses the scope of the use of natural materials as additional materials in pharmaceutical preparations, as dyes, flavors, and fragrances. The topics to be discussed include related regulations, mechanisms as corigens, types, physical and chemical properties, identification and quantification methods, and reviews of stability in preparations and side effects in the body. In this course, students are also asked to design herbal-based health drink/food formulas using natural flavor, aroma, and color additives.

Examination Format/Assessment Methods	:	Project 50%, midterm exam 50%
Learning Media	:	https://elok.ugm.ac.id Offline Course: 75 %; Online: 25%
Literature	:	Main: 14. Law no. 36 of 2009 concerning Health 15. Regulation of the Head of the Food and Drug Supervisory Agency of the Republic of Indonesia Number 12 of 2014 Concerning Traditional Medicine Quality Requirements 16. Regulation of the Minister of Health of the Republic of Indonesia Number 033 of 2012 Concerning Food Additives 17. Bechtold, T and Mussak, R. (eds), 2009, Handbook of Natural Colorants, Wiley and Sons, United Kingdom 18. Delgado-Vargas, F and Paredes-Lopez, O., 2003, Natural Colorants for Food and Nutracetical Uses, CRC Press 19. Merillon, J-M. and Ramawat, K.G., 2020, Sweeteners : Pharmacology, biotechnology and applications, Springer Link 20. O'Donnell, K. and Kearsley, M.W., 2012, Sweeteners and Sugar alternatives in Food Technology, Wiley-Blackwell, John Wiley &Sons, Ltd. 21. Priya, K., et al., 2011, Natural sweeteners : A complete review, Journal of Pharmacy Research, 4 (7), 2034-2039. 22. Baser, K.H.C and Buchbauer, G., 2010, Handbook of Essential Oils : Science, Technology, and Applications, CRC Press 23. Lawless, J., 2012, The Encyclopedia of Essential Oils, The complete guide to the use of aromatic oils in aromatherapy, herbalism, health, and well-being, Conary Pres Addition: 24. Law number. 8 of 1999 concerning Consumer Protection 25. Law number. 7 of 1996 concerning Food 26. Whitehouse, C.R., et al., 2008, The Potential Toxicity of Artificial Sweeteners, AAOHN Journal, 56 (6), 251-259. 27. Drewnowski, A., et al., 2019, Sugar and sweeteners : science, innovations, an consumer guidance for Asia, Asia Pac J. Clin Nutr., 28 (3), 645-663. 28. Chattopadhyay, S., et al., 2014, Artificial sweeteners – A review, J. Food Sci Technol., 51 (4), 611-621. 29. Beltrami, C., et al., 2018, Sweeeteners and sweet taste enhancer in the food insustry, J. Food Sci Technol., 38 (2), 181-187. 30. Holmes, P., 2016, Aromatica : A clinical guide to essential oil therapeutics, Volume I, Singing Dragon, London and Philadelpphiatw

Date of last amendment: August 8th, 2022

Module 109. Synthesis of Raw Materials for Medicine

Synthesis of Raw Materials for Medicine (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221012/elective
Level	:	Undergraduate
Semester	:	Minimum in semester 5
Course Coordinator/Lecturer	:	4. Dr. Hilda Ismail, M.Si, Apt. (Koordinator) 5. Dr. Artania Adnin Tri Suma, M.Si 6. Dr. Rochim Bakti Cahyono, S.T., M.Sc., IPM. 7. Dr. Hanifrahmawan Sudibyo, S.T., M.Eng., M.S.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given a task to be completed together, and the completion of the task will be made in the form of a short report and presented to the lecturer and other students in the course. 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Organic Chemistry I and II
Course Learning Outcomes (CLO)	:	1. Mastering knowledge regarding the definition of drug raw materials, classification, and applicable regulations and requirements 2. Understand and master synthesis techniques, the basic chemical reactions used, preparation of equipment, and separation of synthesis products on a laboratory scale. 3. Understanding the stages of scaling up and developing production towards industrial scale production processes 4. Knowing some examples of the process of producing raw materials for drugs in the industry, the possibility of application in Indonesia

		and the utilization of potential natural resources in Indonesia for BBO production.
Description	:	The lecture on Synthesis of Raw Materials for Drugs (BBO) begins with an explanation of the definition, requirements and regulations applicable in the management of BBO, followed by an explanation of the strategy and method of BBO synthesis, chemical reactions used, equipment preparation, process monitoring to separation and purification on a laboratory scale. The advanced stages of reaction volume development (scaling up), economic feasibility analysis and development strategies that can be carried out are also studied. Several examples of synthesis of raw materials for drugs carried out on an industrial scale are also presented.
Examination Format/Assessment Methods	:	Partisipatif activity 25%, Project 25%, task 10%, midterm exam 20%, final exam 20%
Learning Media	:	https://elok.ugm.ac.id Offline Course: 80 %; Case Study: 20%
Literature	:	Main: 31. Anonim, 2017, Data Industri Farmasi di Indonesia, http://binfar.kemkes.go.id/2013/02/grafik-rekapitulasi-industri-farmasi/, 20 Desember 2017. 32. Armstrong, A.,2001, e-EROS Encyclopedia of Reagents fr organic Synthesis, John Wiley & Sons, London. 33. Fessenden, R.J. & Fessenden, 1986, Kimia Organik, diterjemahkan oleh Aloysius Hadyana Pudjaatmaka, Edisi Ketiga, Jilid 1, 315-318, 327-329, Penerbit Erlangga, Jakarta. 34. Fessenden, R.J. & Fessenden, 1986, Kimia Organik, diterjemahkan oleh Aloysius Hadyana Pudjaatmaka, Edisi Ketiga, Jilid 2, 454-460, Penerbit Erlangga, Jakarta. 35. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R., 1989, Vogel's Textbook Practial Organic Chemistry, Fifth Edition, Cole Publishing, California. 36. Gandjar, I.G. & Rohman, A., 2007, Kimia Farmasi Analisis, Pustaka Pelajar, Yogyakarta. 37. Hogget, J.G., Moodie, R.B., Penton, J.R., Schofield, K., 1971, Nitration and Aromatic Reactivity, Syndics of the Cambridge University Press, New York. 38. Hudlicky,Milos, 1984, Reductions in Organic Chemistry, 23-31, 68-77, Halsted Press, John Wiley & Sons, New York. Addition: related journals and websites

Date of last amendment: August 8th, 2022

Module 110: Technology Process Industry PharmaceuticaL

Technology Process Industry PharmaceuticaL (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221013/elective
Level	:	Undergraduate
Semester	:	Minimum in semester 5
Course Coordinator/Lecturer	:	1. Dr. T.N. Saifullah, Apt (Coor) 2. Dr. Eng. Khadijah, M.Si., Apt
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Pembelajaran berbasis *Project (Team-based Project)* 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. Students learn the basic principles of energy and mass transfer used in pharmaceutical industry processes, and drying and heat transfer processes. 2. Students can understand and utilize the concepts of filtration, particle and powder mixing, particle size reduction, micromiretics, and corrosion.
Description	:	Overall, the Pharmaceutical Industry Process Technology course contains material on the various main processes carried out in producing pharmaceutical products in the pharmaceutical industry.
Examination Format/Assessment Methods	:	50% Project, midterm exam 25%, final exam 25%
Learning Media	:	https://elok.ugm.ac.id Luring: 60%; Daring: 40%
Literature	:	Main: 39. Anthony J. Hikey & David Ganderton, 2010, Pharmaceutical Process Engineering, Vol. 195, 2nd Ed., Informa Healthcare Inc., New York. 40. Alexander, T., Florence, A.T., & Siepmann J., 2009, Modern Pharmaceutics: Basic Principles and System, Vol. 1, 5th Ed., Informa Healthcare Inc., New York.

41. Alexander, T., Florence, A.T., & Siepmann J., 2009, Applications and Advances, Vol. 2, 5th Ed., Informa Healthcare Inc., New York.
42. Green, D. & Perry, R., 2007, Perry's Chemical Engineers' Handbook, 8th Ed., McGraw-Hill, London.

Addition:

1. Banker, G.S. and Rhodes, C.T., 2002, Modern Pharmaceutics, 4th., Marcel Dekker Inc., New York, Basel, Hongkong.
2. Green, D., and Perry, R., 2007, Perry's Chemical Engineers' Handbook, 8th Ed., McGraw-Hill.
3. Masuda, H., Higashitani, K., and Yoshida, H., 2006, Powder Technology Handbook Taylor & Francis Group.
4. Swarbrick, J. (Ed.), 2007, Encyclopedia of Pharmaceutical Technology 3rd, Informa Healthcare USA.
5. Oetjen, G. W. and Haseley, P., 2004., Freeze-Drying, 2nd (Ed)., Wiley-Vch Verlag GmbH & Co.

Note: Includes reference sources for the form of integration of Research and/or PkM into courses.

Date of last amendment: 8 August 2022

Module 112: Virus and Antiviral Drugs

Virus and Antiviral Drugs (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221015/elective
Level	:	Undergraduate
Semester	:	Minimum in semester 5
Course Coordinator/Lecturer	:	1. Apt. Puguh Indrasetiawan, M.Sc., Ph.D. (coordinator) 2. Dr. Apt. Soni Siswanto, M.Biomed.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Pembelajaran berbasis *Project (Team-based Project)* 100 minutes per week for 14 weeks in one semester
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment activities 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hour
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none, but there is no D/E grade in the following courses: Molecular Biology (FAF221201) Pharmaceutical Biochemistry (FAF221103) Cell Biology and Microbiology (FAF221105) Immunology (FAF221510)
Course Learning Outcomes (CLO)	:	1. Students are able to understand viruses and their general characteristics. 2. Students are able to understand, interpret and compare diseases caused by viruses and understand the body's response to viruses. 3. Students are able to compare ways of detecting viruses on biological samples 4. Students are able to choose the type of therapy for infectious diseases caused by viruses
Description	:	Virology studies and understands viruses, their characteristics, life cycles and their role in the spread of disease in general. Various virus detections currently available are studied in this course. The selection of appropriate therapy based on viral infection and the molecular target of the drug is also an important part to study.

Examination Format/Assessment Methods	:	60% Project, 40% quiz.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Payne, S. (2017). Viruses: From understanding to investigation. https://doi.org/10.1016/C2014-0-03894-4 2. Wessner, D. R. (2010) The Origins of Viruses. *Nature Education* 3(9):37 3. Taylor, M. W. (2014). Introduction: A Short History of Virology. Viruses and Man: A History of Interactions, 1–22. 4. Rybicki, E. 2012. A Short History of the Discovery of Viruses. 5. Bell, P. J. L. Viral eukaryogenesis: Was the ancestor of the nucleus a complex DNA virus? *Journal of Molecular Evolution* 53, 251–256 (2001) doi:10.1007/s002390010215. 6. Koonin, E. V. & Martin, W. On the origin of genomes and cells within inorganic

Date of last amendment: 8 August 2022

Module 113: Functional Gene Analysis

Functional Gene Analysis (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221016/elective
Level	:	Undergraduate
Semester	:	4-8
Course Coordinator/Lecturer	:	1. Prof. Dr.rer.nat. apt. Adam Hermawan, M.Sc. (AH), coordinator 2. Dr. apt. Setyowati Triastuti Utami, M.Sc. (STU) 3. Dr. Sci. apt. Rohmad Yudi Utomo, M.Sc. (RYU) 4. Lecturers from outside the faculty of pharmacy UGM
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Case-based learning/PBL/other SCL methods, students will be given real problems in society, then asked to identify the root of the problem and try to find a solution (according to the explanation in the lecture) 3. Practice analysing data with software or databases Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 CSU = 3.2 ECTS
Prerequisites	:	Molecular Biology (FAF221201)
Course Learning Outcomes (CLO)	:	1. Study basic principles in functional genomics, emphasising the transcriptome and proteome, the contribution of functional genomics to biological systems and drug target development as well as socio-ethical aspects of functional genomics in biomedicine and biotechnology, including perspectives on genetic risk information.genes, gene editing, challenges gene therapy 2. Study Next generation high throughput (HTP) sequencing technology, microarray technology, protein separation (2D-PAGE, 2D-LC) and mass spectrometry (MALDI-TOF, ESI-MS) 3. Mastering Computing for functional genomic analysis in drug development and databases for gene Ontology and biological Pathway-Based Analysis, DNA/RNA-protein interactions, and Protein-protein interactions
Description	:	With the advent of high-throughput DNA sequencing technology, complete genome sequences of many organisms are being deciphered

		and analysed, but the ability to understand the cellular function of most of the identified genes remains a challenge. The Functional Gene Analysis course aims to provide a comprehensive approach to understanding genome function, to develop and promote high throughput and large-scale approaches to investigate genome function, genome products, and interactions between the two. This course will provide an overview of the concept of functional genomics and contemporary approaches used to understand genome function. Specifically, this course studies the basic principles of functional genomics, emphasising the transcriptome and proteome, the contribution of functional genomics to biological systems and drug target development, socio-ethical aspects of functional genomics in biomedicine and biotechnology, including perspectives on genetic risk information, next generation high throughput (HTP) sequencing technology, microarray technology, protein separation (2D-PAGE, 2D-LC), mass spectrometry (MALDI-TOF, ESI-MS), protein structure analysis (X-ray crystallography, NMR), molecular imaging and computing for functional genomics analysis in drug development.
Examination Format/Assessment Methods	:	30% Participatory activities, 70% Project
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary: 1. Gasperskaja, E., and V. Kučinskas. 2017. 'The most common technologies and tools for functional genome analysis', Acta Med Litu, 24: 1-11. 2. Huang, Da Wei, Brad T. Sherman, Qina Tan, Jack R. Collins, W. Gregory Alvord, Jean Roayaei, Robert Stephens, Michael W. Baseler, H. Clifford Lane, and Richard A. Lempicki. 2007. 'The DAVID Gene Functional Classification Tool: a novel biological module-centric algorithm to functionally analyze large gene lists', Genome Biology, 8: R183. 3. Mi, Huaiyu, Anushya Muruganujan, John T. Casagrande, and Paul D. Thomas. 2013. 'Large-scale gene function analysis with the PANTHER classification system', Nature Protocols, 8: 1551-66. 4. Ochs, Michael F. 2007. Gene function analysis (Springer). 5. https://www.r-project.org/ Additional: 6. Hermawan, A., M. Ikawati, R. I. Jenie, A. Khumaira, H. Putri, I. P. Nurhayati, S. M. Angraini, and H. A. Muflikhasari. 2021. 'Identification of potential therapeutic target of naringenin in breast cancer stem cells inhibition by bioinformatics and in vitro studies', Saudi Pharm J, 29: 12-26. 7. Hermawan, A., and H. Putri. 2022. 'Bioinformatics analysis reveals the

potential target of rosiglitazone as an antiangiogenic agent for breast cancer therapy', BMC Genom Data, 23: 72.
8. Hermawan, A., H. Putri, N. Hanif, N. Fatimah, and H. H. Prasetio. 2022. 'Identification of potential target genes of honokiol in overcoming breast cancer resistance to tamoxifen', Front Oncol, 12: 1019025.
9. Hermawan, A., F. Wulandari, N. Hanif, R. Y. Utomo, R. I. Jenie, M. Ikawati, and A. S. Tafrihani. 2022. 'Identification of potential targets of the curcumin analog CCA-1.1 for glioblastoma treatment: integrated computational analysis and in vitro study', Sci Rep, 12: 13928.
10. The latest scientific journal

Note: Includes reference sources from the form of integration of Research and/or PkM into courses

Date of last amendment: 8 August 2022

Module 114: Analysis of Macromolecular Pharmaceutical Products

Analysis of Macromolecular Pharmaceutical Products (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221017/elective
Level	:	Undergraduate
Semester	:	3
Course Coordinator/Lecturer	:	1. Dr. apt. Muthi Ikawati, M.Sc. (coordinator) 2. Dr. apt. Riris Istighfari Jenie, M.Si. 3. Dr.rer.nat. apt. Siti Nurul Hidyah, M.Sc. 4. Dr. Endah Puji Septisetyani, M.Sc. (BRIN)
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using two methods, namely: 1. Tutorials and discussions: lectures begin with lecturer explanations and are followed by questions and answers with students. 2. Project-based learning (team-based project): students are divided into small groups (minimum 4 groups; maximum members 5/group), each group is accompanied by a lecturer who composes a popular scientific article related to one of the macromolecular pharmaceutical products which includes a description (meeting 4th), purification (7th meeting), analysis techniques (12th meeting), and results of research development (15th lecture meeting). The draft articles were presented briefly at the end of the lecture meeting mentioned above. Articles are finalized and approved by the lecturer no later than 1 week after the UAS and can be published on the UGM Pharmacy Knowledge Channel if deemed appropriate. Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. classify (classify-understand) various kinds of macromolecular pharmaceutical products and explain (explain-understand) the outline of their production and use (use-apply) basic knowledge related to the structure of proteins and nucleic acids for secondary and tertiary structure analysis of drug proteins. 2. explain (explain-understand) the basic principles of purification of macromolecular products and the application of HPLC-MS for their analysis.

		3. explain (explain-understand) the basic principles of various methods of characterization and analysis of macromolecular products, including Edman degradation, electrophoresis, immunoassay, and binding assay, and use them (use-apply) in interpreting data resulting from these test methods. 4. explain (explain-understand) the basic principles of cell-based assays in macromolecular product development research and the application of macromolecular pharmaceutical product analysis techniques in vaccine and biosimilar drug development research, as well as use them (use-apply) in interpreting data generated in these researches.
Description	:	The development of various macromolecular pharmaceutical preparation products requires the development of analytical methods to guarantee the quality of these preparations. The Macromolecular Pharmaceutical Product Analysis course studies the analytical methods used to analyze macromolecular pharmaceutical products including drugs, cosmetic preparations, health supplements, vaccines, xenobiotics in the form of proteins, peptides, and DNA/RNA (nucleic acids). In this course students will learn about the types of macromolecular pharmaceutical products, the structure of proteins and nucleic acids, instrumental techniques for analyzing macromolecular pharmaceutical products such as size exclusion chromatography, sodium dodecyl sulphate - polyacrylamide gel electrophoresis (SDS-PAGE), binding assays used in pharmacopoeial-based testing for drug proteins, applications of various techniques used for pharmacopoeial-based testing include ELISA, radio-immunoassay (RIA), polymerase chain reaction (PCR), capillary electrophoresis, fingerprinting with HPLC/HPLC-MS, Edman reaction ; methods for detecting secondary and tertiary structures of drug proteins, as well as cell-based assays.
Examination Format/Assessment Methods	:	10% Participatory activities, 40% Project, 25% midterm exam, 25% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary: 1. Kayser, O. & Warzecha, H. (Eds.) (2012). Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, 2nd Ed., Wiley-VCH Verlag & Co. KGaA , Weinheim, Germany. 2. Crommelin D.J.A. & Sindelar R.D. (Eds.). (2008). Pharmaceutical Biotechnology: An Introduction for Pharmacists and Pharmaceutical Scientists, 3rd Edition, Harwood Academic Publishers, Amsterdam. 3. Walsh G., 2007, Pharmaceutical Biotechnology: Concepts and Applications, John Wiley & Sons Ltd., England. 4. European Pharmacopeia, 11th Ed. (2023).

https://www.edqm.eu/en/european-pharmacopoeia-ph.-eur.-11th-edition
5. Leader B., Baca Q. & Golan D. (2008). Protein therapeutics: a summary and pharmacological classification. Nature Review Drug and Discovery. 7: 21–39. https://doi.org/10.1038/nrd2399
6. Lagasse H, A., Alexaki A., Simhadri V. L., Katagiri N. H., Jankowski W., Sauna Z. E., & Kimchi-Sarfaty C. (2017). Recent advances in (therapeutic protein) drug development. F1000Res. 7(6): 113. https://doi.org/10.12688/f1000research.9970.1

Additional:

7. Santoso A., Septisetyani E. P., Ramadani R. D., Rubiyana Y., Prasetyaningrum P. W., Wisnuwardhani P. H., Kusumawati A., Nuraini N. (2022). Glycoengineering of Darbepoetin-α in CHO-DG44 Cells through Overexpression of α-2,3-sialyl-transferase and CMP-sialic Acid Transporter. HAYATI Journal of Biosciences, 29(2): 204-213. https://doi.org/10.4308/hjb.29.2.204-213
8. Septisetyani E. P., Herlina N., Kusumawati A., Prasetyaningrum P. W., Prastyowati A., Santoso A., Mustopa A. Z., (2021). Establishment of anti-HBcAg Monoclonal Antibodies for Sandwich ELISA Application by Iliac Method Utilizing Incomplete Adjuvant. International Journal on Advanced Science, Engineering and Information Technology. 11(6): 2226-2232. http://dx.doi.org/10.18517/ijaseit.11.6.13077
9. Calef Sánchez-Trasviña, Miguel Flores-Gatica, Daniela Enriquez-Ochoa, Marco Rito-Palomares, and Karla Mayolo-Deloisa. (2021). Purification of Modified Therapeutic Proteins Available on the Market: An Analysis of Chromatography-Based Strategies. Frontiers in Bioengineering and Biotechnology. doi: 10.3389/fbioe.2021.717326.
10. Irene van den Broek, Wilfried M.A. Niessen, William D. van Dongen. (2013). Bioanalytical LC–MS/MS of protein-based biopharmaceuticals. Journal of Chromatography B, (929): 161–179. http://dx.doi.org/10.1016/j.jchromb.2013.04.030.
11. Other recent related sources (scientific articles from journals of international reputation) (selected journal articles).

Note: Includes reference sources from the form of integration of Research and/or PkM into courses

Date of last amendment: 8 August 2022

Module 117: Halal Science Philosophy

Halal Science Philosophy (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221020/elective
Level	:	Undergraduate
Semester	:	Minimal semester 6
Course Coordinator/Lecturer	:	1. Prof. Dr. Abdul Rohman (faculty of Pharmacy UGM) 2. Prof. Dr. Yuny Erwanto (Faculty of animal science UGM) 3. Dr. Lily Arsanti Lestari, STP (Faculty of medicine UGM) 4. Dr. Muhammad Zainal Abidin, S.Pt., M.Biotech, IPM (Faculty of animal science UGM) 5. Dr. Agustina Ari B (Faculty of Pharmacy UGM) 6. Dr. Marlyn Dian Laksitorini, M.Sc. (Faculty of Pharmacy UGM, coordinator)
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using two methods, namely: 1. Tutorials and discussions: lectures begin with lecturer explanations and are followed by questions and answers with students. 2. Project-based learning (team-based project): students are divided into small groups (minimum 4 groups; maximum members 5/group), each group is accompanied by a lecturer who composes a popular scientific article related to one of the macromolecular pharmaceutical products which includes a description (meeting 4th), purification (7th meeting), analysis techniques (12th meeting), and results of research development (15th lecture meeting). The draft articles were presented briefly at the end of the lecture meeting mentioned above. Articles are finalized and approved by the lecturer no later than 1 week after the UAS and can be published on the UGM Pharmacy Knowledge Channel if deemed appropriate. Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. Students understand the scope of the course and the principles of halal medicinal, cosmetic and food products 2. Students understand how to produce halal food, consumer goods, cosmetics and medicines

		3. Students understand how halal certification is done in Indonesia 4. Students understand the principles of halal product authentication using various methods
Description	:	This course provides knowledge about the principles of halal food, cosmetics and medicine products, how to produce halal food and medicine, the certification process that applies in Indonesia and comparative studies with processes abroad (for example in Malaysia), as well as product halal authentication using various methods
Examination Format/Assessment Methods	:	10% Assignment, 50% Project, 20% midterm exam, 20% final exam
Learning Media	:	PPT, LMS
Literature	:	1. Yunes Ramadan Al-Teinaz. 2020. The Halal Food Handbook. John Wiley & Sons Ltd, West Sussex, PO19 8SQ, UK 2. Riaz, M.N. and Chaudry, M.M. (2004). Halal Food Production. Boca Raton, FL: CRC Press. 3. Tlili, S. (2012). Animals in Islam and Halal Ethics. In: Animals in the Qur'an (ed. M. Dahlan-Taylor). New York, NY: Cambridge University Press. 4. Sudjadi dan Rohman, A. Analisis derivate Babi. UGM Press, Yogyakarta. 5. Rohman, A. and Cheman, Y.B. (2012). Analysis of pig derivatives for halal authentication studies. Food Reviews International 28: 97–112.

Date of last amendment: 8 August 2022

Module 119: Biomedical instrumentation

Biomedical instrumentation (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221022/elective

Level	:	Undergraduate
Semester	:	Even
Course Coordinator/Lecturer	:	1. Prof. Dr. apt. Edy Meiyanto, M.Si. (coordinator) 2. Muhammad Novrizal Abdi Sahid, M.Eng., Ph.D., Apt. 3. Dr. Sci. apt. Rohmad Yudi Utomo, M.Sc. 4. Prof. Drs. Gede Bayu Suparta, M.S., Ph.D. (FMIPA)
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given an assignment to complete together, and the completion of the assignment will be made in the form of a short report and presented to the lecturer and other students in the course. 4. Case-based learning/PBL/other SCL methods, students will be given real problems in society, then asked to identify the root of the problem and try to find a solution (according to the explanation in the lecture) Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hoursg
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. understand the scope of biological instruments and the principles of immunofluorescence in biomedical sample analysis applications 2. explains various techniques and applications of biological instruments such as microscopes, flow cytometry, PCR, and microarrays 3. explains the principles of accelerator-based instruments and their application to biomedical sample detection 4. explains several accelerator-based instrument techniques such as PET, SPECT, TEM, SEM, BNCT, and MRI and biomedical sample detection applications
Description	:	Biomedicine is a science that combines various sciences in pharmacy and medicine, including biochemistry, cell and molecular biology, as well as pathophysiology, to understand human health and disease. This Biomedical Equipment course covers innovation in the fields of science, pharmacy and technology for the development of instrumentation used in health services, especially diagnostic equipment based on examining

		macromolecular markers. This course prepares students to understand the types, validation systems and operational standards of the instruments used. The topics discussed are the types and working principles of instruments used for nucleotide and protein-based marker detection, critical points for each instrument, how to validate each instrument, and troubleshooting each instrument. The instruments discussed include sample preparation equipment, sample carrier and storage equipment, molecular diagnostic kits, microscopes, ELISA readers, and PCR.
Examination Format/Assessment Methods	:	20% Assignment, 40% midterm exam, 40% final exam
Learning Media	:	PPT, LMS
Literature	:	1. Barker K. At The Bench A Laboratory Navigator, 1998, Cold Spring Harbour Laboratory Press, New York 2. Helgason CD and Miller CL. Methods in Molecular Biology, vol. 290: Basic Cell Culture Protocols, Third Edition, 1999, Humana Press Inc., Totowa 3. Allison W. Fundamental Physic for Probing and Imaging. 2006. Oxford University Press. Oxford 4. Bagaswoto, Meiyanto E, Sardjono Y, Prasetyono AP, Bangun AA. Prospek Boron Neutron Capture Therapy di Indonesia : Aspek Medis, 2017, Lintang Pustaka Utama, Yogyakarta 5. Sardjono Y, Bagaswoto, Meiyanto E, Prasetyono AP. Teaching Hospital dan Industri Obat: Terapi Kanker Berbasis Boron Neutron Capture Therapy, 2018, Lintang Pustaka Utama, Yogyakarta 6. Related scientific articles from reputable journals Note: Includes reference sources from the form of integration of Research and/or PkM into courses

Date of last amendment: 8 August 2022

Module 121: Healthy Lifestyle Management

Healthy Lifestyle Management (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221024/elective

Level	:	Undergraduate
Semester	:	-
Course Coordinator/Lecturer	:	1. Prof. Dr. Triana Hertiani, M.Si., apt. (coordinator) 2. Dr. Nida Ul Hasanat, M.Si. R. Dwi Budiningsari, SP, MKes, Ph.D 3. Dr. Mirza Hapsari, SGz. MPH, RD 4. Harry Freitag LM, S.Gz, M.Sc, RD, PhD 5. Dyaningtyas Dewi Pamungkas Putri, PhD., M.Sc., apt
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Project-based Learning (Team-based Project) and Case-based Learning/PBL Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. Students are able to identify problems related to lifestyle and the factors that influence them with a cross-disciplinary approach 2. Students are able to design alternative solutions to problems related to healthy lifestyles in society through a cross-disciplinary approach
Description	:	This course is an interdisciplinary elective course offered in the Health Nutrition, Pharmacy and Psychology Undergraduate Study Program which has taken at least the first 3 semesters in each study program. This course is given in the form of lectures from lecturers and practitioners, emphasizing case and project based learning in the form of discussions of real problems in society related to healthy lifestyles, and is carried out in the form of a Focus Group Discussion. At the end of the lecture, the student group is expected to be able to produce a project related to solving this problem. Lectures will be held using the flip classroom method with eLOK and Zoom meetings as a medium for student discussion with lecturer supervision
Examination Format/Assessment Methods	:	25% Participatory activities, 60% project, 15% quiz
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary : 1. Dasgupta A and Hammet-Stabler, C.A, (Eds), 2011, Herbal supplement Efficacy, Toxicity, Interactions with Western Drugs, and Effects on Clinical Laboratory Tests, edited by., John Wiley and Son, New Jersey

2. Kopelman, P. G., Caterson, I. D., & Dietz, W. H. (Eds.). (2009). Clinical obesity in adults and children. John Wiley & Sons
3. Buettner, D. (2015). The blue zones solution: Eating and living like the world's healthiest people. National Geographic Books.
4. Sarafino., E.P. and Smith, E.W., 2014, Health psychology: psychosocial interactions, John Willey and Sons

Additional :

5. Related scientific journals

Date of last amendment: 8 August 2022

Module 123: Nanotherapeutics

Nanotherapeutics (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	**:**	FAFP221026/elective
Level	**:**	Undergraduate
Semester	**:**	-

Course Coordinator/Lecturer	:	1. Dr. apt. Soni Siswanto, M.Biomed (coordinator) 2. Dr. apt. Adhyatmika, S.Farm., M.Biotech. 3. Dr. apt Mindya Kusumorini, S.Farm.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Case-based Learning Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Pharmacology I (FAF221203) Physical Pharmacy I (FAF221108)
Course Learning Outcomes (CLO)	:	1. Students are able to understand the basics of nanotechnology in drug delivery, explore the design, development and application of nanoscale materials for targeted and controlled drug delivery systems 2. Students are able to understand the toxicological aspects of nanomaterials, interactions of nanomaterials with biological systems, safety evaluation methods, and risk mitigation due to the use of nanomaterials
Description	:	This course studies nanotechnology systems in drug delivery and their toxicity.
Examination Format/Assessment Methods	:	50% quiz, 25% midterm exam, 25% final exam.
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary: 1. Akçan, R., Aydogan, H. C., Yildirim, M. Ş., Taştekin, B., & Sağlam, N. (2020). Nanotoxicity: a challenge for future medicine. Turkish journal of medical sciences, 50(4), 1180–1196. https://doi.org/10.3906/sag-1912-209 2. Gao, J.; Karp, J. M.; Langer, R.; Joshi, N. (2023). The Future of Drug Delivery. Chem. Mater. 35 (2), 359– 363, DOI: 10.1021/acs.chemmater.2c03003 3. Lin, X., & Chen, T. (2023). A Review of in vivo Toxicity of Quantum Dots in Animal Models. International journal of nanomedicine 18, 8143–8168. https://doi.org/10.2147/IJN.S434842 4. Liu, F., Pradhan, R., Druhl, E., Freund, E., Liu, W., Sauer, B. C., Cunningham, F., Gordon, A. J., Peters, C. B., & Yu, H. (2019). Learning to detect and understand drug discontinuation events from clinical narratives. Journal of the American Medical Informatics Association:

JAMIA, 26(10), 943–951. https://doi.org/10.1093/jamia/ocz048
5. Mazayen, Z. M., Ghoneim, A. M., Elbatanony, R. S., Basalious, E. B., & Bendas, E. R. (2022). Pharmaceutical nanotechnology: from the bench to the market. Future journal of pharmaceutical sciences, 8(1), 12. https://doi.org/10.1186/s43094-022-00400-0
6. Mondal, J., Pillarisetti, S., Junnuthula, V., Surwase, S. S., Hwang, S. R., Park, I. K., & Lee, Y. K. (2022). Extracellular vesicles and exosome-like nanovesicles as pioneering oral drug delivery systems. Frontiers in bioengineering and biotechnology, 11, 1307878. https://doi.org/10.3389/fbioe.2023.1307878
7. Wein W. (2016). Drug development: successes, problems and pitfalls-the industry perspective. ESMO open, 1(1), e000033. https://doi.org/10.1136/esmoopen-2016-000033

Date of last amendment: 8 August 2022

Module 124 Nutrigenomics and nutraceuticals

Nutrigenomics and nutraceuticals (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221027/elective
Level	:	Undergraduate
Semester	:	4

Course Coordinator/Lecturer	:	1. Dr. apt. Rumiyati, M.Si. (coordinator) 2. Prof. Dr. Dra. Sunarti, M.Kes. (FKKMK) 3. apt. Marlyn Dian Laksitorini, M.Sc., Ph.D. 4. Dr. Cintya Nurul Apsari, S.T.P., M.Si.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using the method: 1. Tutorials and discussions: lectures begin with lecturer explanations and are followed by questions and answers with students. 2. Project-based learning (team-based project): students are divided into several groups, each group examines several scientific articles on different topics including nutrigenomics, nutragenetics and the development of nutraceuticals on ageing, cancer & gut health, infectious diseases & immune system, obesity & diabetes, heart disease & lipid metabolism, inflammatory bowel diseases, and presented at meetings 7 and 14. Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. explain (explain-understand) the meaning of nutraceuticals, nutrigenomics, nutrigenetics and epigenetics, as well as the role of nutrients and explore the bioactive content in food ingredients as raw materials for nutraceuticals in maintaining health and supporting therapy. 2. explain (explain-understand) nutrigenomics and nutrigenetics in obesity and diabetes, heart disease and lipid metabolism, inflammatory bowel diseases, adult neurogenesis and use (use-apply) formulation technology for the development of personalized nutraceuticals and for example in cancer and obesity and diabetes. 3. explain (explain-understand) and interpret (use-apply) the results of the latest research on nutrigenomics and nutraceuticals from scientific articles related to pharmaceutical science.
Description	:	This course studies the interaction between nutrients and bioactive ingredients in the diet on gene expression. The course will discuss the meaning of nutraceuticals, nutrigenomics, nutrigenetics and epigenetics; the important role of nutrients and bioactive ingredients in maintaining health and supporting therapy; exploration of sources of bioactive

		ingredients in nutraceuticals and their molecular mechanisms of action; the molecular mechanisms of nutraceuticals in providing health benefits and their role in controlling diseases such as obesity and diabetes, heart disease and lipid metabolism, inflammatory bowel diseases, ageing, cancer, brain health, gut health and disease; The role of nutraceuticals in improving the immune system.
Examination Format/Assessment Methods	:	10% Participatory activities, 40% project, 25% midterm exam, 25% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary: 1. Mahabir, O., Pathak, Y.V., 2013, Nutraceuticals and Health Review of Human Evidence, CRC Press 2. Ferguson, L., 2013, Nutrigenomics and Nutrigenetics in Functional Foods and Personalized Nutrition, CRC-Press 3. Pathak, Y.V., Ardekani, A.M., 2017, Nutrigenomics and Nutraceuticals Clinical Relevance and Disease Prevention, CRC Press 4. Haslberger, A.G., 2022, Advances in Precision Nutrition, Personalization and Healthy Aging, Springer Link 5. R. Rajakumari, Oluwatobi Samuel Oluwafemi, Sabu Thomas, Nandakumar Kalarikkal, Dietary supplements containing vitamins and minerals: Formulation, optimization and evaluation, Powder Technology, Volume 336, 2018, Pages 481-492, 6. Dauncey MJ. Recent advances in nutrition, genes and brain health. Proc Nutr Soc. 2012 Nov;71(4):581-91. doi: 10.1017/S0029665112000237. Epub 2012 May 3. PMID: 22716958. Additional: 7. Widyaswara, G. , Rumiyati, Purwestri1, Y.A., 2021, Management Diets with Functional Analogue Rice control TCF7L2 Expression of Rattus norvegicus 1769, Berkenhout Model Type 2 Diabetes Mellitus, Research Journal of Biotechnology, Vol. 16 (4) 8. Firdausia, R.S., Rumiyati, Nugroho, A.E., Purwestri, Y.A., Pranoto, Y., 2021, The Effect of Functional Rice Analogue Diet from Mocaf, Corn, Pigeon Pea and Seaweed on Rats Model of Type 2 Diabetes, Food Research, 5(4), 238-247 9. Sunarti, Santoso, U, Pramana, A.A.C., Huriyati, E., Rubi, D.S., 2020, High Fiber and Beta Carotene from Sweet Potatoes and Pumpkin Improve Insulin Resistance by Inhibition of Sterol Regulatory Binding Protein 1c in Liver of Hypertriglyceridemic Rats. Open Access Macedonian Journal of Medical Sciences (OAMJMS) 10. Malik, R, Sunarti, Sadewa, A.H., 2020, High fiber diets enhance IL-10 gene expression and its level on hyperlipidemic rats model. Curr Res Nutr Food Sci 2020; 8(2) 11. Recent Research Journal/Review Article

Date of last amendment: 8 August 2022

Module 125: Molecular Modeling

Molecular Modeling (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221028/elective
Level	:	Undergraduate
Semester	:	Even
Course Coordinator/Lecturer	:	1. Dr. Sci. apt. Rohmad Yudi Utomo, M.Sc. (coordinator) 2. apt. Navista Sri Octa Ujiantari, M.Sc.

		3. Dr. apt. Hari Purnomo, M.S. 4. Dr. Yudhi Nugraha S Putra, M.Biomed.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given an assignment to complete together, and the completion of the assignment will be made in the form of a short report and presented to the lecturer and other students in the course. 4. Case-based learning/PBL/other SCL methods, students will be given real problems in society, then asked to identify the root of the problem and try to find a solution (according to the explanation in the lecture) Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. understand the scope of current molecular modeling developments in drug discovery 2. explains the principles of small molecule-based molecular modeling 3. explains the utilization and processing of chemoinformatics-bioinformatics databases in molecular modeling 4. explains molecular modeling techniques in CADD 5. explains the process of determining molecular structure through the molecular crystallization method and its application in molecular modeling
Description	:	Discusses the topic of the latest developments in molecular modeling in drug discovery by utilizing chemoinformatics and bioinformatics databases, applying LBDD, SBDD, pharmacophore modeling and machine learning techniques.
Examination Format/Assessment Methods	:	50% project, 25% midterm exam, 25% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	1. Hinchliffe, A. Molecular Modelling for Beginners: Second Edition, Wiley, West Sussex, 2008

	2. Schlick, T. Molecular Modeling and Simulation: An Interdisiplinary Guide Second Edition, Springer, New York, 2010 3. Bajorath, J. Chemoinformatics and Computational Chemical Biology, Humana Press, London, 2011 4. Related scientific articles from internationally reputable journals.

Date of last amendment: 8 August 2022

Module 127:Immunology Engineering

Immunology Engineering (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	**:**	FAFP221030/elective
Level	**:**	Undergraduate
Semester	**:**	Minimum semester 4

Course Coordinator/Lecturer	:	1. apt. Muhammad Novrizal Abdi Sahid, M.Eng., Ph.D. (coordinator) 2. drh. Retno Murwanti, M.P., Ph.D. 3. Dr. apt. Muthi` Ikawati, M.Sc. 4. Dr. apt. Dyaningtyas Dewi P. P., M.Sc. 5. Dr. Endah Puji Septisetyani, M.Sc.
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Can be taken by students of the health cluster, Faculty of Veterinary Medicine, and Faculty of Biology
Course Learning Outcomes (CLO)	:	Explain (understand) the basic concepts of what engineering can be done on components of the immune system to improve a disease or immune condition of an individual
Description	:	The Immunology Engineering course is a course that explains what technological engineering can be done to improve an individual's disease or immune condition.
Examination Format/Assessment Methods	:	30% Assignment, 35% midterm exam, 35% final exam
Learning Media	:	PPT, LMS
Literature	:	Primary: 1. Jirsch DW, Immunological Engineering, Springer Dordrecht, 2012. https://doi.org/10.1007/978-94-011-6182-4

Date of last amendment: 8 August 2022

Module 128: Pharmaceutical Protein Engineering

Pharmaceutical Protein Engineering (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221031/elective
Level	:	Undergraduate
Semester	:	2

Course Coordinator/Lecturer	:	1. Dr. Riris Istighfari Jenie, M.Si., Apt (coordinator) 2. Prof. Dr. Adi Santosa (BRIN) 3. Dr. Rumiyati, M.Si., Apt. 4. apt. Setyowati Triastuti Utami, Ph.D. 5. drh. Retno Murwanti, Ph.D 6. Dr. apt. Dyaningtyas Dewi Pamungkas Putri
Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	SCL: Pembelajaran berbasis Project (Team-based Project) Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	none
Course Learning Outcomes (CLO)	:	1. Students can explain the types of pharmaceutical proteins, the classification of pharmaceutical proteins and the role of pharmaceutical proteins as a class of macromolecular drugs that need to be characterized and developed. 2. Students can understand various methodologies that can be used in the production of pharmaceutical proteins 3. Students can explain and compare various engineering strategies for proteins to produce good pharmaceutical protein products
Description	:	This course discusses the development of protein products as macromolecular drugs (protein pharmaceuticals), types of proteins used for therapy, approaches used for pharmaceutical protein engineering, recombinant protein expression as the main methodology in pharmaceutical protein production, pharmaceutical protein production using E. coli, yeast, mammalian cells and cell free methods. Apart from that, it also discusses protein engineering strategies that are currently developing to produce good pharmaceutical protein products, including glycosylation, PEGylation, lipidation, antibody drug conjugates, site specific mutagenesis, Fc fusion, etc.
Examination Format/Assessment Methods	:	15% Participatory activities, 35% project, 25% midterm exam, 25% final exam
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary: 1. Ebrahimi, S.B., Samanta, D. Engineering protein-based therapeutics through structural and chemical design. Nat Commun 14, 2411

(2023). https://doi.org/10.1038/s41467-023-38039-x
2. Casteleijn, M. G., & Richardson, D. (2014). Engineering Cells and Proteins – creating pharmaceuticals. European Pharmaceutical Review, 2014(4). https://www.europeanpharmaceuticalreview.com/article/26576/engineering-cells-proteins-creating-pharmaceuticals/
3. Leader, B., Baca, Q. & Golan, D. Protein therapeutics: a summary and pharmacological classification. Nat Rev Drug Discov 7, 21–39 (2008). https://doi.org/10.1038/nrd2399

Additional:
4. Santoso, A., Kitagawa, N-I., Wardiana, A., Kusumawati, A., Septisetyani, E.P., Kawaichi, M., Rubiyana, Y., Wisnuwardhani, P.H., Meiyanto, E., 2012, PRODUKSI PROTEIN FARMASETIK RECOMBINANT HUMANERYTHROPOIETIN (rhEPO) DENGAN MODIFIKASI POLA GLIKOSILASI, Prosiding InSINas 2012.
5. Santosa, A., 2019, PERKEMBANGAN TEKNOLOGI SEL MAMALIA CHINESE HAMSTER OVARY (CHO) UNTUK PRODUKSI OBAT BERBASIS PROTEIN, Berita Biologi, 18(2), DOI: 10.14203/beritabiologi.v18i2.3705
6. Santosa, A., dan Lisdiyanti, P., 2021, Pengembangan Obat Biologi Bioteknologi, Biosimilar, dan Reverse Engineering, LIPI Press, Jakarta.
7. Septisetyani, E.P., Rubiyana, Y., Wisnuwardhani, P.H., Wardiana, A., Santoso, A., 2012, EXPRESSION OF RECOMBINANT HUMAN ERYTHROPOIETIN WITH GLYCOSYLATION MODIFICATION IN HEK293T CELLS, Indonesian J. Pharm. Vol. 23 No. 3: 177 – 182

Note: Includes reference sources from the form of integration of Research and/or PkM into courses

Date of last amendment: 8 August 2022

Module 131: Terapi Gen

Terapi Gen (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221034/elective
Level	:	Undergraduate
Semester	:	4-8
Course Coordinator/Lecturer	:	1. Dr.rer.nat. apt. Adam Hermawan, M.Sc. (AH), coordinator 2. Dr. apt. Setyowati Triastuti Utami, M.Sc. (STU) 3. Dr. apt. Dyaningtyas Dewi Pamungkas Putri, M.Sc. (DDPP) 4. Lecturers from outside the faculty of Pharmacy UGM

Language	:	Indonesian, English
Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem 3. Project-based learning (Team-based Project), where students will be divided into several groups, then given an assignment to complete together, and the completion of the assignment will be made in the form of a short report and presented to the lecturer and other students in the course. Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Molecular Biology (FAF221201)
Course Learning Outcomes (CLO)	:	1. explaining (understanding) the basic concepts of gene therapy related to pharmaceuticals which includes an overview of gene therapy; vectors, gene preparation and design, gene editing, gene therapy challenges 2. applying knowledge about gene therapy in pharmaceuticals, including for drug development and disease identification 3. interpreting (evaluating) gene therapy research results from scientific articles related to pharmaceutical science
Description	:	This course discusses genetic mutations that cause pathological disorders in humans, target diseases for gene therapy, types of oligonucleotides used for gene therapy (DNA, RNA, antisense), gene preparations used in gene therapy (including basic principles cloning), genome editing (including CRISPR-CAS9), gene transfer methods, in vivo antisense RNA production, examples of ex vivo-in vivo gene therapy applications, and antisense oligonucleotides as therapeutic agents.
Examination Format/Assessment Methods	:	30% Participatory activities, 70% project
Learning Media	:	LMS (elok.ugm.ac.id)
Literature	:	Primary: 1. Kagawa, Shunsuke, and Toshiyoshi Fujiwara. 'Gene therapy for cancer treatment.' in, Gene Therapy: Technologies & Applications 2. Manfredsson, Fredric P, and Matthew J Benskey. 2019. Viral Vectors for Gene Therapy (Springer) 3. Uddin, Fathema, Charles M Rudin, and Triparna Sen. 2020. 'CRISPR

gene therapy: applications, limitations, and implications for the future', Frontiers in oncology, 10: 1387
4. Zu, Hui, and Danchen Gao. 2021. 'Non-viral vectors in gene therapy: recent development, challenges, and prospects', The AAPS Journal, 23: 1-12

Additional:
5. Omar NF, Widiyanto TW, Utami ST, Niimi M, Niimi K, Toh-e A, Kajiwara S. 2021. Vph1 is associated with the copper homeostasis of Cryptococcus neoformans serotype D. The Journal of General and Applied Microbiology 67: 195-206.
6. Putri DDP. 2018. Functional elucidation of MTMR3 and MTMR4 in innate immune response.
7. Putri DDP, Kawasaki T, Murase M, Sueyoshi T, Deguchi T, Ori D, Suetsugu S, Kawai T. 2019. PtdIns3P phosphatases MTMR3 and MTMR4 negatively regulate innate immune responses to DNA through modulating STING trafficking. Journal of Biological Chemistry 294: 8412-8423.
8. Utami ST, Indriani CI, Bowolaksono A, Yaguchi T, Chen X, Niimi K, Niimi M, Kajiwara S. 2020. Identification and functional characterization of Penicillium marneffei major facilitator superfamily (MFS) transporters. Bioscience, Biotechnology, and Biochemistry 84: 1373-1383.
9. Goji K, Ozaki K, Sadewa AH, Nishio H, Matsuo M. 2006. Somatic and germline mosaicism for a mutation of the PHEX gene can lead to genetic transmission of X-linked hypophosphatemic rickets that mimics an autosomal dominant trait. The Journal of Clinical Endocrinology & Metabolism 91: 365-370.

Note: Includes reference sources from the form of integration of Research and/or PkM into courses

Date of last amendment: 8 August 2022

Module 132: Stem cell therapy

Stem cell therapy (2 Credits/3.2 ECTS)

Advanced Pharmacy Practice		
Code/Status	:	FAFP221035/elective
Level	:	Undergraduate
Semester	:	Minimum semester 4
Course Coordinator/Lecturer	:	1. apt. Muhammad Novrizal Abdi Sahid, M.Eng., Ph.D. (coordinator) 2. Prof. Dr. apt. Edy Meiyanto, M.Si. 3. Dr. apt. Riris Istighfari Jenie, M.Si. 4. Dr. apt. Nunung Yuniarti, M.Si. 5. Dr. drg. Ferry Sandra
Language	:	Indonesian, English

Teaching Method/Duration of Classes per Week for One Semester	:	Learning will be carried out using several methods: 1. Tutorial, where students will listen to the lecturer's explanation 2. Discussion, where students will ask questions or answer questions about a problem Teaching duration 100 minutes per week for 14 weeks in one semester and 2 weeks for examination
Workload	:	100 minutes of in-class lectures 120 minutes of structured assignment 120 minutes of independent activities In total 340 minutes/week In 16 weeks = 5440 minutes = 90.67 hours 1 ECTS = 28 hours
Credits	:	2 Credits/3.2 ECTS
Prerequisites	:	Can be taken by students of the health cluster, Faculty of Veterinary Medicine, and Faculty of Biology
Course Learning Outcomes (CLO)	:	1. Explain the basic concept of mutations that result in genetic defects, ethics in stem cell and molecular therapy, and the basic principles and applications of gene therapy 2. Understand the basic principles of development and application of stem cells for therapy of a disease or treatment
Description	:	The Stem Cell Therapy course discusses stem cells, how to obtain them, their use for disease therapy and the world of pharmacy. Methods that can be used for stem cell development/production will also be explained. Normative and ethical aspects of the use of stem cells in therapy will also be discussed.
Examination Format/Assessment Methods	:	30% Assignment, 35% midterm exam, 35% final exam
Learning Media	:	PPT, LMS
Literature	:	Primary: 1. Antonica F, Kasprzyk DF, Opitz R, Iacovino M, Liao XH, Dumitrescu AM, Refetoff S, Peremans K, Manto M, Kyba M, Costagliola S. Generation of functional thyroid from embryonic stem cells, Nature. 2012 Nov 1;491(7422):66-71. doi: 10.1038/nature11525. Epub 2012 Oct 10 2. Battler, A. and Leon, J., 2006, Stem Cell and Gene-based therapy, Frontier in Regenerative Medicine, Springer. 3. Cooke, ST, 2008, Antisense Drug Technology, Principles, Strategies and Applications, 2nd ed., CRC Press, London 4. David E Newton, 2017, DNA Technology, A Refference Handbook, Second Edition, ABC-CLIO,Santa Barbara California 5. Kerisna, F, 2004, An Introduction to Molecular Medicine and Gene Therapy, John Willey and Son. 6. Nagwa El-Badri (Ed), 2017, Advances in Stem Cell Therapy, Bench to Bedside, Humana Press, Springer International Publishing Switzerland 7. Templeton NS., 2008, Gene and Cell Therapy, Therapeutic Mechanism and Strategies, 3rd ed., CRC Press London

8. Wiwanitkit, V., 2009, Cell, Gene and Molecular Therapy, New concepts, Nova Biomedical Books, New York.

Additional:

9. Selected research article

Note: Includes reference sources from the form of integration of Research and/or PkM into courses

Date of last amendment: 8 August 2022