MODULE HANDBOOK
MASTER IN BIOMEDICAL ENGINEERING

THE GRADUATE SCHOOL

UNIVERSITAS GADJAH MADA

2025

Contents

Biomedical Engineering Principles

Module designation	An overview of multidisciplinary collaboration in solving biomedical and health problems, as well as an understanding of the branches of science and types of research in biomedical engineering.
Module level, if applicable	Master
Code	SPSTB212101
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	drg. Heribertus Dedy Kusuma Yulianto., M.Biotech., PhD.
Lecturers	drg. Heribertus Dedy Kusuma Yulianto., M.Biotech., PhD. drg. Aryan Morita, M.Sc., Ph.D. Prof. Ir. Alva Edy Tontowi, M.Sc., Ph.D., IPM., ASEAN Eng.
Language	Indonesian & English
Relation to curriculum	Compulsory course
Type of teaching, contact hours	This course is planned to have 13 teaching weeks, 1 meeting for lab visit, and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion, - Lab visit.

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 1: Able to use knowledge in the fields of engineering, health, and biology to analyze problems in the field of biomedical engineering globally that are relevant to public needs. PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 5: Able to convey the results of work in the field of biomedical engineering in writing orally or verbally

Content	1. Introduction to biomedical engineering, 2. Biomolecular principles: atoms, molecules, macromolecules, 3. General aspects of human anatomy and physiology, 4. Biomechanics 5. Cardiovascular dynamics, 6. Biotechnology- Proteins design and engineering, 7. Fundamentals of signaling in biological systems and implications for biomedical engineering, 8. Engineering principles in biomedicine, 9. Systems biology and biomedical engineering / Biotechnologies for biomedical engineers, 10. Bioimaging, image processing and analysis, 11. Nanobiotechnology for biomedical engineering. 12. Laboratory visit → Dental Learning Centre: Hardness Test, SEM, etc.
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation per meeting. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Enderle, J.D., Blanchard S.M. & Bronzino J.D., 2005, Introduction to Biomedical Engineering (2a Ed.). San Diego, California, EE.UU.: Elsevier Academic Press 2. Saltzman, W.M., 2009, Biomedical Engineering: Bridging Medicine and Technology, Yale University (Cambridge Texts in Biomedical Engineering) 3. M. Rinastiti, Trianna Wahyu Utami, Bonifasius Primario Wicaksono, Agustinus Winarno, M.K. Herliansyah, Widowati Siwomihardjo, Alva E Tontowi, Puput Iin Qur'aini, Dyah Anindya Widyasrini, H. Dedy Kusuma Yulianto, Dinar Arifianto, Retno Ardhani, Rosa Amalia, Nunuk Purwanti, 2021, Dari Hulu ke Hilir, Perjalanan Sebuah Alat Kesehatan, UGM Press.
Last modified	November 2025.

Anatomy and Physiology for Biomedical Engineering

Module designation	Provides basic medical knowledge regarding human anatomy and physiology as a basis for subsequent courses in the field of Biomedical Engineering.
Module level, if applicable	Master
Code	SPSTB212103
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	dr. Rina Susilowati, Ph.D.
Lecturers	dr. Rina Susilowati, Ph.D. dr. Nur Arfian, Ph.D. dr. R. Jajar Setiawan, M.Sc., Ph.D
Language	Indonesian
Relation to curriculum	Compulsory course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Laboratory visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 1: Able to use knowledge in the fields of engineering, health, and biology to analyze problems in the field of biomedical engineering globally that are relevant to public needs. PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction: medical terminology 2. The cellular level of organization. 3. Organ systems of the body: endocrine 4. Organ systems of the body:musculo skeletal 5. Organ systems of the body: nervous system 6. Organ systems of the body: special senses 7. Organ systems of the body: cardiovascular system 8. Organ systems of the body: respiratory system 9. Organ systems of the body: digestive system 10. Organ systems of the body: reproductive system 11. Laboratory visit → Anatomy Lab of the Medical Faculty: fundamentals of human anatomy and 3D printing in the field of anatomy & custom cranioplasty, etc.
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation per meeting. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	Tortora G, Derrickson B, (2014) Principles of Anatomy and Physiology 14th ed. Wiley. ISBN: 9781118808436
Last modified	November 2025.

Bioethics and Safety

Module designation	Provides a deep understanding of ethics in medical and health services and research as well as an understanding of ethics related to laboratory animals in medical and health research.
Module level, if applicable	Master
Code	SPSTB212207
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Dr. drh. Agustina Dwi Wijayanti, M.P.
Lecturers	Dr. drh. Agustina Dwi Wijayanti, M.P. Prof. Dr. drh. Pudji Astuti, M.P. Dyah Listyarifah, MD, MSc.,D.Med.Sci
Language	Indonesian
Relation to curriculum	Compulsory course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion.

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Case study = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 1: Able to use knowledge in the fields of engineering, health, and biology to analyze problems in the field of biomedical engineering globally that are relevant to public needs. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 6: Able to demonstrate professionalism and adhere to principles bioethics.

Content	1. Ethics in Health and Medical Treatment and Research 2. Professional Ethics in Biomedical Engineering 3. Beneficence, Nonmaleficence, and Technological Progress 4. Ethical Issues of Animal and Human Experimentation in the 5. Development of Medical Devices 6. Regulation of Medical Device Innovation 7. Nonhuman primate in biomedical research, ethical consideration. 8. The Role of Professional Societies in Biomedical Engineering 9. Issues related ethics in health and medical treatment 10. Issues related ethics in health and medical research 11. Issues related ethics in animal experimentation 12. Informed consent 13. Role of law in clinical ethics 14. Case based ethical analysis and safety simulations → practice developing research ethics protocols and conducting risk assessments
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation per meeting. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Sastrowijoto, S., Ismail D., Hakimi, M., Ngatidjan, Supartinah A., Kushadiwijaya H., Hadijah S., Widyarini S., 2008, Etika Penelitian dan Publikasi Kedokteran- Kesehatan dan Modul Pelatihan WHO, diedit oleh Indriati E., Yogyakarta: Fakultas kedokteran Universitas Gadjah Mada. 2. Abee CR., Mansfield K., Tardif S., Morris T., (editor), 2012. Nonhuman Primates in Biomedical Research, Vol. 1: Biology and Management, Elsevier, London.
Last modified	November 2025.

Applied Biostatistics

Module designation	Provides an understanding of the presentation of statistical data in research in the field of biomedical engineering as well as an understanding of statistical analysis of research data in the field of biomedical engineering.
Module level, if applicable	Master
Code	SPSTB212206
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Dr. drg. Rosa Amalia, M.Kes.
Lecturers	Dr. drg. Rosa Amalia, M.Kes. drg. Aryan Morita, M.Sc., Ph.D. drg. Heribertus Dedy Kusuma Yulianto., M.Biotech., PhD. Dr. drg. Dibyo Pramono, S.U., MDSc
Language	Indonesian
Relation to curriculum	Compulsory course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical activities → SPSS software

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/practical activity = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 1: Able to use knowledge in the fields of engineering, health, and biology to analyze problems in the field of biomedical engineering globally that are relevant to public needs. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Summarizing and presenting data 2. Hypothesis Testing for Continous Data 3. Hypothesis testing for Categorical data 4. Descriptive statistics 5. Non-Parametric Statistics 6. Sample Size Estimation 7. Correlation & Sample Linear regression 8. Multiple Regression 9. Logistic Regression 10. Diagnostic Test 11. Multivariations Analysis 12. Relation of Odds Ratio (OR) and Relative Risk (RR) 13. Practical Activities → SPSS software to analyse data
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation per meeting. Exams are done by task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Bland, M. 2000. An Introduction to Medical Statistics. Oxford University Press, Oxford. 2. Hosmer, D.W. & Lemeshow, S. 1989. Applied Logistic Regression. John Wiley & Sons, New York. 3. Lemeshow, S., Hosmer, D.W., Klar, J. and Lwanga, S.K. 1990. Adequacy of Sample Size in Health Studies. John Wiley & Sons, New York. 4. Rosner, B. 2006. Fundamentals of Biostatistics. Thomson Brooks/Cole, Singapore. 5. Sorlie, D.E. 1995. Medical Biostatistics and Epidemiology. Appleton & Lange. Norwalk, Connecticut
Last modified	November 2025.

Applied Biomedical System Design

Module designation	Provides understanding and explanation regarding the design of a system or medical device in the biomedical field as well as advanced knowledge about system concepts, system thinking and system analysis.
Module level, if applicable	Master
Code	SPSTB212104
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Ir. Rini Dharmastiti, M.Sc., Ph.D., IPM, ASEAN Eng.
Lecturers	Ir. Rini Dharmastiti, M.Sc., Ph.D., IPM, ASEAN Eng. Dr. Urip Agus Salim, S.T., M.Eng.Sc. Ir. I Gusti Bagus Budi Dharma, S.T., M.Eng., Ph.D., IPM., ASEAN. Eng. Ir. Dawi Karomati Baroroh, S.T., M.Sc., Ph.D.
Language	Indonesian & English
Relation to curriculum	Compulsory course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities → Fusion software, HoQ method

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 1: Able to use knowledge in the fields of engineering, health, and biology to analyze problems in the field of biomedical engineering globally that are relevant to public needs. PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field.

Content	1. Introduction to biomedical system design 2. Differences between engineering and physiological control system 3. System design analysis: fundamental concepts 4. Basic problem in biomedical system design 5. Basic modelling concept 6. System Characterization 7. Mathematical modeling 8. Generalized system properties 9. Medical instruments and devices 10. Modelling applications (360Fusion) 11. Practical Activities: 3D design using Fusion
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation per meeting. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	King, P. H., Fries, R. C., Johnson, A. T., 2015, Design of Biomedical Devices and Systems 3rd Edition, Taylor & Francis, FL Ulrich, K.T. and Eppinger, S.D., 2012, Product Design and Development, 6th Ed, McGraw-Hill, Inc. Ashby, M., Shercliff, H. and Cebon, D., 2007 Material Engineering, Science, Processing and Design, Elsevier Weinger, M.B., Wiklund, M.E., Gardner-Bonneau, D.J, 2011, Handbook of Human Factors in Medical Device Design, CRC Press, Taylor & Francis Group Produk Inovatif Desain Konsep, Prototype dan HKI (Desain Industri-Paten), Prof. Ir. Alva Edy Tontowi, M.Sc., Ph.D, Mei 2013
Last Modified	November 2025.

Applied Mathematics for Bioengineering

Module designation	Provides an explanation of basic mathematical theories and an understanding of mathematical applications in biomedical engineering.
Module level, if applicable	Master
Code	SPSTB212104
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Ir. Muhammad Waziz Wildan, M.Sc., Ph.D., IPU.
Lecturers	Ir. Muhammad Waziz Wildan, M.Sc., Ph.D., IPU. Ir. Rini Dharmastiti, M.Sc., Ph.D., IPM, ASEAN Eng.
Language	Indonesian
Relation to curriculum	Compulsory course & English
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities → math modelling in BME

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activity = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 1: Able to use knowledge in the fields of engineering, health, and biology to analyze problems in the field of biomedical engineering globally that are relevant to public needs. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to mathematics for bioengineering 2. Derivation and integral functions, 3. Basic of differential equation, first order of differential equation, 4. Laplace transformation, 5. Fourier function, 6. Physiological control system 7. Mathematical modeling on human physiological system. 8. Practical Activities → MathLab
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Kreizyg, E. (2011). Advanced Engineering Mathemathics, 10th ed., John Willey and Sons, New York. 2. Zill, D.G. and Wright, W.S., 2009, Advanced Engineering Mathematics, 4th ed., Jones & Barlett Publishers. 3. James, G., Burley D., Clements, D., Dyke, P., Searl, J., Steele, N., Wright, J., 2011, Advanced Modern Engineering Mathematics, Pearson 4. Khoo, M.C.K., 2018, Physiological Control Systems, analysis, simulation and estimation, Wiley & Sons
Last modified	November 2025.

Research Methodology and Experimental Design

Module designation	Provides an understanding of research methodology biomedical field and research design.
Module level, if applicable	Master
Code	SPSTB212105
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Prof. Dr. drg. Siti Sunarintyas, M.Kes.
Lecturers	Prof. Dr. drg. Siti Sunarintyas, M.Kes. Dr. Ir. Budi Arifvianto, S.T., M.Biotech. Adhyatmika, Apt., M.Biotech., Ph.D.
Language	Indonesian & English
Relation to curriculum	Compulsory course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 4: Able to communicate and work effectively in a multi-disciplinary team. PLO 6: Able to demonstrate professionalism and adhere to principles Bioethics. PLO 7: Able to develop oneself sustainably and adapt to developments in science and technology biomedical technology.

Content	1. Introduction and Research Question 2. Bias in Research 3. Research population and sampling 4. Research concepting 5. Research Variable 6. Pengukuran, reliability, validity 7. Observational research design 8. Experimental research design 9. Randomized Clinical Trial (RCT) 10. Unrandomized Clinical Trial (Quasy Experimental) 11. Cohort Study 12. Case-Control Study 13. Cross-Sectional Study 14. Practical Activities → design of experiment
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation per meeting. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	Bronzino, Joseph D. (2006). The Biomedical Engineering Handbook: Medical Device and systems (3rd edition). Sterman, J.D., 2000, Business Dynamics: System thinking and modeling for a complex world, McGraw-Hill Company.
Last modified	November 2025.

Biomedical Signal Acquisition

Module designation	This course aims to provide students with an understanding and expertise regarding the characteristics of various types of sensors and technologies in using biomedical sensors for the purpose of collecting data and information from biomedical systems.
Module level, if applicable	Master
Code	SPSTB212228
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Dr. Indah Soesanti, S.T., M.T.
Lecturers	Dr. Indah Soesanti, S.T., M.T. Ir. Noor Akhmad Setiawan, S.T., M.T., Ph.D, IPM.
Language	Indonesian
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities/Laboratory visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/practical activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction: Basics of Sensors and Measurement 2. Software-based Sensors 3. Pyshical Sensors 4. Chemical Sensors 5. Optical Sensors 6. Bio-inspierd and life-inspired Sensors 7. Image Sensors and Medical Imaging 8. Blood Pressure Measurement 9. Blood Flow Measurement 10. Blood Chemistry Measurement 11. Wireless Sensor Networks and Smart Sensors in Health 12. Practical Activities → types of sensors
Study and examination requirements and forms of examination	Classes are conducted with 70% classic tutorial and 30% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	Enderle, J. and Bronzino, J., 2012. Introduction to biomedical engineering. Academic press. Bronzino, J.D. and Peterson, D.R., 2018. Medical devices and human engineering. CRC Press. Webster, J.G., 2014 Measurement, Instrumentation and Sensors Handbook,CRC Press Wang, Ping, Liu and Qingjun, 2011. Biomedical Sensors and Measurement, Springer.
Last modified	November 2025.

Applied Biomaterials

Module designation	Provides understanding and presentation of applied biomaterials and their applications in the field of biomedical engineering.
Module level, if applicable	Master
Code	SPSTB212221
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Prof. Dr. drg. Siti Sunarintyas, M.Kes.
Lecturers	Prof. Dr. drg. Siti Sunarintyas, M.Kes. Ir. Muhammad Waziz Wildan, M.Sc., Ph.D., IPU. Dr. Ir. Budi Arifvianto, S.T., M.Biotech. Ir. Rini Dharmastiti, M.Sc., Ph.D., IPM, ASEAN Eng.
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion. - Laboratory visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Laboratory visit= 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to advanced biomaterial 2. Advanced metallic and polymeric biomaterial 3. Advanced ceramics biomaterial 4. Advanced composite biomaterial 5. Bioadhesive 6. Surface Engineering, biological surface modification 7. Biotribology 8. Biomaterials failure analysis and prevention. 9. Fractography 10. Biomaterial's fabrication. 11. Laboratory activities → instrument to test many types fo biomaterial
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Callister Jr., WD., 2000, Material Science and Engineering, 6th ed. John Wiley and Sons, New York. 2. Black, J. 1992, " Biological Performance of Materials, 2nd Edition, Marcel & Dekker, New York 3. Park, J.B. dan Laker, R.S. 1992, " Biomaterials-An Introduction", 2nd Edition, Plenum Press, New York 4. Davis, J.R., 2003, ASM Vol. 23: Handbook of Materials for Medical Devices. ASM International
Last modified	November 2025.

Biomedical Signal Analysis

Module designation	This course aims to provide an in-depth analysis of how bioelectric signals are processed in biomedical systems.
Module level, if applicable	Master
Code	SPSTB212229
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Dr. Indah Soesanti, S.T., M.T.
Lecturers	Dr. Indah Soesanti, S.T., M.T. Ir. Noor Akhmad Setiawan, S.T., M.T., Ph.D., IPM
Language	Indonesian
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction Physiological Origins of Biosignals 2. Characteristics of Biosignals 3. Signal Acquisition 4. Representation of Biological Signals 5. Linear Systems 6. Signal Averaging and Transforms 7. Signal Processing System Design for Biomedical Applications 8. Multivariate Spectral Analysis of Electroencephalogram 9. General Linear Modeling of Magnetoencephalography Data 10. Emergence of Groupwise Registration in MR Brain Study 11. Functional Optical Brain Imaging 12. Causality Analysis of Multivariate Neural Data 13. Practical activity → biomedical signal analysis
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Enderle, J. and Bronzino, J., 2012. Introduction to biomedical engineering. Academic press. 2. Bronzino, J. D. (2017). Biomedical signals, imaging, and informatic
Last modified	November 2025.

Maintenance Management in Healthcare Systems

Module designation	Provides an understanding of the principles and functions of maintenance management in healthcare systems.
Module level, if applicable	Master
Code	SPSTB212243
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Ir. Andi Rahadiyan Wijaya, S.T., M.Sc., Ph.D., IPM., ASEAN Eng.
Lecturers	Ir. Andi Rahadiyan Wijaya, S.T., M.Sc., Ph.D., IPM., ASEAN Eng. Ir. Rini Dharmastiti, M.Sc., Ph.D., IPM, ASEAN Eng.
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Maintenance – basic concepts, purpose, functions and objectives of maintenance. 2. Maintainability, mean time to failure, mean time to repair. 3. Reliability – basic concepts – bathtub curve – failure rate – mean time before failure. 4. Availability – inherent, achieved and operational availability. 5. Reliability centered maintenance (RCM) – flow diagram, basic guidelines. 6. Reliability centered maintenance (RCM) – Failure modes and effects analysis (FMEA), Failure mode effect criticality analysis (FMECA) 7. Reliability centered maintenance (RCM) – methodology 8. Fault tree analysis (FTA), Event tree analysis (ETA), Root cause analysis (RCA) 9. Total productive maintenance (TPM) – basic concepts, purpose, functions and objectives. 10. Total productive maintenance (TPM) – methodology. 11. Maintenance costs – classification of maintenance costs, maintenance cost analysis, cost effectiveness analysis. 12. Maintenance effectiveness – overall equipment effectiveness, key performance indicators, maintenance performance measuring indices. 13. Human factor in maintenance – manpower planning for maintenance, objectives and stages of manpower planning, training for maintenance personnel. 14. Computer-aided maintenance management system (CMMS) – functions, applications and advantages of CMMS. 15. Practical activity → CMMS software
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Garg M. R., Industrial Maintenance, S. Chand & Co., 1986. 2. Higgins L. R., Maintenance Engineering Hand book, McGraw Hill, 5th Edition, 1988. 3. Mishra R. C. and Pathak K., Maintenance Engineering and Management, PHI Learning Pvt. Ltd., New Delhi, 2009

Last modified	November 2025.

Biomedical Instrumentation and Devices

Module designation	Conveys how to use electronic devices commonly used for biomedical signal processing and explains the signals commonly measured and their measurement methods.
Module level, if applicable	Master
Code	SPSTB212225
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Ir. Prapto Nugroho, S.T., M.Eng., D.Eng., IPM.
Lecturers	Ir. Prapto Nugroho, S.T., M.Eng., D.Eng., IPM. Ridwan Wicaksono, S.T., M.Eng., Ph.D
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Project

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Sources and properties of biomedical signals. 2. Differential amplifiers. 3. Feedback, frequency response, and gain stability. 4. Operational amplifiers and comparators. 5. Instrumentation amplifiers and isolated amplifiers in biomedical instrumentation. 6. Noise in biomedical signal processing. 7. Digital interfaces. 8. Anti-aliasing filter design.
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Robert B. Northrop (2012), Michael R. Neuman, Series Editor: Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation, Second Edition, CRC Press. 2. Bonnie C. Baker, AN699: Anti-Aliasing, Analog Filters for Data Acquisition Systems (1999), Microchip Technology.
Last modified	November 2025.

Biomaterial Testing and Characterization

Module designation	Provides an understanding of biomaterials, their characterization, and applications in biomedical engineering and explains biomaterial testing.
Module level, if applicable	Master
Code	SPSTB212220
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Ir. Muhammad Kusumawan Herliansyah, S.T., M.T., Ph.D., IPM, ASEAN Eng.
Lecturers	Ir. Muhammad Kusumawan Herliansyah, S.T., M.T., Ph.D., IPM, ASEAN Eng. Ir. Muhammad Waziz Wildan, M.Sc., Ph.D., IPU. dr. Rina Susilowati, Ph.D. Dyah Listyarifah, MD, MSc.,D.Med.Sci
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 12 teaching weeks, 2 meetings for lab visit, and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Lab Visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Lab Visit = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to biomaterials and their characteristic 2. Biomaterial properties and characterization 3. Degradation of biomaterials in biological environments 4. Biomaterial Characterization 5. Metallic biomaterials 6. Polymeric biomaterials 7. Ceramic biomaterials 8. Composite biomaterials 9. Corrosion: fundamentals, testing, and protections 10. Destructive and non-destructive testing 11. Laboratory Visit → tensile testing, impact testing, hardness, etc.
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation per meeting. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Callister Jr., WD., 2000, Material Science and Engineering, 6th ed. John Wiley and Sons, New York. 2. Black, J. 1992, " Biological Performance of Materials, 2nd Edition, Marcel & Dekker, New York 3. Park, J.B. dan Laker, R.S. 1992, " Biomaterials-An Introduction", 2nd Edition, Plenum Press, New York 4. Davis, J.R., 2003, ASM Vol. 23: Handbook of Materials for Medical Devices. ASM International 5. ASM Vol. 8: Mechanical Testing and Evaluation. 2000. ASM International.
Last modified	November 2025.

Artificial Intellegence in Biomedical Engineering

Module designation	This course aims to provide students with expertise in artificial intelligence theory applied to provide solutions to complex biomedical problems.
Module level, if applicable	Master
Code	SPSTB212227
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Dr. Eng. Igi Ardiyanto, S.T., M.Eng.
Lecturers	Dr. Eng. Igi Ardiyanto, S.T., M.Eng. Dr. Eng. Ir. Sunu Wibirama, S.T., M.Eng., IPM
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to Applications of Artificial Intelligence in Biomedicine 2. Overview of Artificial Intelligence 3. Artificial Intelligence and Machine Learning 4. Regression 5. Naive Bayes Classification 6. Instance Based Learning 7. k-Means Clustering 8. Principal Component Analysis 9. Decision Tree Decision Rule Decision Table Random Forest 10. Support Vector Machine 11. Artificial Neural Networks 12. Clustering 13. Ensemble Learning 14. Fuzzy Logic and Genetic Algorithms 15. Deep Learning 16. Artificial Intelligence System Design for Biomedical Applications 17. A System for Melanoma Diagnosis Based on Data Mining 18. Fuzzy Naïve Bayesian Approach for Medical Decision Support
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Agah, A. (2014). Medical applications of artificial intelligence. Boca Raton, Taylor & Francis. 2. Lisboa, P. J. G. (2000). Artificial neural networks in biomedicine. London, Springer. 3. Smolinski, T. G., Milanova, M. G., & Hassanien, A. E. (2010). Computational intelligence in biomedicine and bioinformatics: current trends and applications. Berlin, Springer.
Last modified	November 2025.

Biomedical Imaging and Image Processing

Module designation	Describes the types of medical imaging equipment, their principles and how they work, and explains medical image processing techniques to obtain better image results and support the image analysis process.
Module level, if applicable	Master
Code	SPSTB212226
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Dr. Indah Soesanti, S.T., M.T.
Lecturers	Dr. Indah Soesanti, S.T., M.T. Dr. Eng. Igi Ardiyanto, S.T., M.Eng.
Language	Indonesian
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to biomedical imaging 2. Image formation and acquisition principles 3. Radiography: X-rays projection, fluoroscopy and computed tomography (CT) 4. Ultrasound imaging (US) 5. Magnetic resonance imaging (MRI) 6. Nuclear medicine: SPECT and PET 7. Fundus camera 8. Introduction to digital image processing 9. Image Enhancement I: Contrast enhancement and normalisation 10. Image Enhancement II: Filtering, denoising and edge detection 11. Image Registration: Features, similarity measures, transformations 12. Image Segmentation I: Histogram-based technique, colour image- based 13. Image Segmentation II: Region growing, clustering-based 14. Medical Image Reconstruction: MRI CT
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Chris Guy and Dominic, “An Introduction to the Principles of Medical Imaging” World Scientific (2005) 2. Gonzalez, R. C. and Woods, R. E., “Digital Image Processing” Prentice Hall 3rd Ed. (2009) 3. Geoff Dougherty, “Digital Image Processing for Medical Applications” Cambridge University Press. (2009)
Last modified	November 2025.

Drug Delivery System

Module designation	Provides an understanding of pharmacokinetics and drug formulation design, understanding of modern analytical techniques in the pharmaceutical field, as well as providing an understanding of drug delivery systems and their applications in the field of Biomedical engineering.
Module level, if applicable	Master
Code	SPSTB212223
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Adhyatmika, Apt., M.Biotech., Ph.D.
Lecturers	Adhyatmika, Apt., M.Biotech., Ph.D. Dr. rer. nat. Ronny Martien, M.Si Dr. apt. Sekar Ayu Pawestri Dr. apt. Nindya Kusumorini
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical activities → Design Expert Software

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction on Drug Delivery System 2. Biopharmaceutic and pharmacokinetic principal of drug 3. Evaluation of drug delivery system 4. Biotechnological products and drug delivery system 5. Modified of drug delivery system 6. Modern analytical techniques 7. Pharmacokinetecs and formulation design 8. Advances in pharmaceutical technology (pharmaceutics) 9. Design & development of novel delivery systems 10. Practical activity → a practice of formula optimization using Design Expert Software
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Instrumental Methods of Analysis - Scoog and West 2. Methods of Drug Analysis — Gearien, Graboski. 3. Yie W. Chien, Novel Drug Delivery Systems, Drugs and Pharm. Sci. Series, Vol.14, Marcel Dekker Inc.N.Y. 4. Bert N. LaDu, "Fundamentals of Drug Metabolism & Disposition", Waverley. Press Inc., Baltimore, 1972
Last modified	November 2025.

Biocompatibility

Module designation	Providing an in-depth understanding of the meaning and principles of biocompatibility and bioactivity
Module level, if applicable	Master
Code	SPSTB212224
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Prof. Dr. drg. Widowati Siswomihardjo, M.Sc
Lecturers	Prof. Dr. drg. Widowati Siswomihardjo, M.Sc drg. Intan Puspita, M.Kes. Ph.D.
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Laboratory Visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Laboratory Visit = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to biocompatibility 2. Bioactivity of materials 3. Mechanical behavior 4. Material selection 5. Biocompatibility: testing and procedure: 1 6. Biocompatibility: testing and procedure: 2 7. Review of material and discussion 8. Independent assignment: Journal review 9. Mechanical interaction between biomaterials and biological systems (osseointegration) 10. Compatibility conditions: 1 11. Compatibility conditions: 2 12. Review of material and discussion 13. Group assignment: discussion 14. Group assignment: Presentation 15. Laboratory visit → biocompatibility testing
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Black, J. 1992, " Biological Performance of Materials, 2nd Edition, Marcel & Dekker, New York 2. Park, J.B. dan Laker, R.S. 1992, " Biomaterials-An Introduction", 2nd Edition, Plenum Press, New York 3. Davis, J.R., 2003, ASM Vol. 23: Handbook of Materials for Medical Devices. ASM International
Last modified	Desember 2025

Medical Informatics and Telemedicine

Module designation	Providing an understanding of the principles, standards, and applications of telemedicine. Providing an understanding of telemedicine technology.
Module level, if applicable	Master
Code	SPSTB212230
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Dr. Indah Soesanti, S.T., M.T
Lecturers	Dr. Indah Soesanti, S.T., M.T dr. M. Lutfan Lazuardi, M.Kes., Ph.D
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activity

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activity = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. History and evolution of telemedicine, functional diagram of telemedicine system, telemedicine, tele health, tele care, organs of telemedicine, advances in telemedicine. 2. Ethical and legal aspects of telemedicine - confidentiality, social and legal issues, safety and regulatory issues,. 3. Telemedical technology, principles of multimedia, data communications and networks, air/wireless communications, satellite communication. 4. Mobile hand held devices and mobile communication, internet technology and telemedicine, video and audio conferencing, clinical data –local and centralized. 5. Telemedical standards, data security and standards: encryption, cryptography, mechanisms of encryption, phases of encryption. Video conferencing, real-time telemedicine integrating doctors / hospitals, clinical laboratory data, radiological data, and other clinically significant biomedical data 6. Administration of centralized medical data, security and confidentially of medical records and access control, cyber laws related to telemedicine. 7. Mobile telemedicine: tele-radiology: definition, basic parts of tele-radiology system: image acquisition system, display system. Tele-pathology, multimedia databases, color images of sufficient resolution, dynamic range, spatial resolution, compression methods, interactive control of color. 8. Medical information storage and management for telemedicine- patient information medical history, test reports, medical images diagnosis and treatment. Hospital information system - doctors, paramedics, facilities available. Pharmaceutical information system. 9. Telemedical applications, telemedicine access to health care services – health education and self-care. 10. Introduction to robotics surgery, Telesurgery, Telecardiology, Teleoncology, Telemedicine in neurosciences. 11. Electronic Documentation, e-health services security and interoperability. 12. Business aspects - Project planning and costing, Usage of telemedicine. 13. Project 1: Developing a simple telemedicine application 14. Project 2: Developing a clinical decision support system
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.

Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Norris, A.C. Essentials of Telemedicine and Telecare. Wiley (ISBN 0-471-53151 0), 2002 2. Wootton R. Craig, J., Patterson, V. (Eds.), Introduction to Telemedicine. Royal Society of Medicine Press Ltd (ISBN 1853156779), 2006 3. O'Carroll, P.W, Yasnoff W.A., Ward E.Ripp, L.H., Martin, E.L. (Eds), Public Health Informatics and Information Systems. Springer (ISBN 0-387-95474-0), 2003 4. Ferrer-Roca, O., Sosa-Iudicissa, M. (editors), Handbook of Telemedicine. IOS Press (Studies in Health Technology and Informatics, Volume 54). (ISBN 90-5199 413-3), 2002. 5. SimProgram Studion, W. 2006. Video over IP. A practical guide to technology and applications. Focal Press (Elsevier). ISBN-10: 0-240-80557-7 6. Bemmel, J.H. van, Musen, M.A. (Eds.) (1997). Handbook of Medical Informatics. Heidelberg, Germany: Springer. (ISBN 3-540-63351-0
Last modified	Desember 2025.

Computational and Systems Biology

Module designation	Providing an understanding of the basics of cell and molecular biology, protein analysis, and structure using scientific and mathematical approaches. Providing an understanding of mathematical formulations of cellular models.
Module level, if applicable	Master
Code	SPSTB212231
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Afiahayati, S.Kom., M.Cs, Ph.D
Lecturers	Afiahayati, S.Kom., M.Cs, Ph.D dr. Gunadi, Ph.D., Sp.BA
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Fundamentals of biology, molecular biology, cell biology 2. The fundamentals of nucleic acid and protein sequence and structural analysis, an introduction to the analysis of complex biological systems. 3. General biochemistry 4. Biological chemistry 5. Introduction to computer science and programming 6. Introduction to electrical engineering and computer science 7. Probability and random variables 8. Probabilistic systems analysis and applied probability 9. The foundation for quantitative studies of cellular processes using mathematical tools and computer simulations. 10. The spatial and temporal scales of different physical and chemical processes in the cell 11. Quantitative studies of cellular processes using mathematical tools and computer simulations 12. Independent Assignment I: Journal review 13. Independent Assignment II: Presentation and discussion 14. Independent Assignment III: Presentation and discussion
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Zvelebil, Marketa, and Jeremy O. Baum. Understanding Bioinformatics. New York, NY: Garland Science, 2007. ISBN: 9780815340249. 23 2. Alon, Uri. An Introduction to Systems Biology: Design Principles of Biological Circuits. Boca Raton, FL: Chapman & Hall, 2006. ISBN: 9781584886426. 3. Watson, J. D., T. A. Baker, S. P. Bell, A. Gann, M. Levine, and R. Losick. Molecular Biology of the Gene. 6th ed. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press, 2007. ISBN: 9780805395921. 4. Alberts, B., A. Johnson, J. Lewis, M. Raff, K. Roberts, and P. Walter. Molecular Biology of the Cell. 5th ed. New York, NY: Garland Science, 2008. ISBN: 9780815341055.
Last modified	Desember 2025.

Biocomputational Language

Module designation	Providing an understanding of biocomputational language concepts. Able to describe topics, tools, and applications of computational linguistics in the field of biomedical engineering.
Module level, if applicable	Master
Code	SPSTB212232
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Yunita Sari, S.Kom, M.Sc, Ph.D
Lecturers	Yunita Sari, S.Kom, M.Sc, Ph.D Prof. Dra. Sri Hartati, M.Sc., Ph.D
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activity

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities= 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to NLP, Bio-Medical NLP and research in this area. 2. Text processing, Regular Expression, Python programming (basic) 3. Text classification using perceptron (basic) 4. Language modelling (basic and advanced) 5. Named Entity Recognition (basic and related to biomedical text) 6. Independent Assignment I : bio-computational language project for biomedical engineering application (idea pitching) 7. Part of Speech tagging using HMM Statistical modeling and machine learning 8. Natural Language Inference (identifying inference relation: entailment, neutral or contradiction -between sentences) 9. Computer-aided Diagnostic 10. Independent Assignment II : Project Presentations 11. Practical Activities → Computer Aided Diagnostic
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Jurafsky, D. and J. H. Martin, Speech and language processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition (2nd Edition). Prentice-Hall, 2008 2. Dickinson, Brew, and Meuers 2013, Language and Computers
Last modified	Desember 2025.

Biomedical Informatics

Module designation	Providing an understanding of biomedical informatics concepts Providing an understanding of biomedical information concepts and their use in decision making.
Module level, if applicable	Master
Code	SPSTB212233
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Afiahayati, M.Cs., Ph.D
Lecturers	Afiahayati, M.Cs., Ph.D drg. Ryna Dwi Yanuaryska., Ph.D
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activity= 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Biomedical Informatics: The Science and the Pragmatis 2. Biomedical Data: Their Acquisition, Storage, and Use 3. Biomedical Decision Making: Probabilistic Clinical Reasoning 4. Cognitive Science and Biomedical Informatics 5. Computer Architectures for Health Care and Biomedicine 6. Software Engineering for Health Care and Biomedicine 7. Standards in Biomedical Informatics 8. Natural Language and Text Processing in Health Care 9. Ethics and Health Informatics: Users, Standards, and Outcomes 10. Bioinformatics (genome data, basic task in bioinformatics) 11. Bioinformatics (NGS, next generation sequencing) 12. Bioinformatics (NGS Analysis) 13. Bioinformatics (NGS Analysis) 14. Bioinformatics (AI for biomedicine) 15. Practical activities → Software for Health Care and Biomedicine
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Shortlife., E.H., and , 2014, Biomedical Informatics-Computer Application in Health Care and Biomedicine (4th edition), Springer 2. Jones., N., and Pevzner., P., 2014, An Introduction to Bioinformatics Algorithms, MIT Press 3. Pevzner., P., and Shamir., R., 2004, Bioinformatics for Biologist., Cambridge University Press
Last modified	Desember 2025.

Management of Medical Data

Module designation	Providing an understanding of medical data applications, analysis, visualization, management, and architecture. Providing an understanding of medical data presentation and manipulation using computer applications.
Module level, if applicable	Master
Code	SPSTB212234
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	dr. Lutfan Lazuardi, M.Kes., Ph.D.
Lecturers	dr. Lutfan Lazuardi, M.Kes., Ph.D. Prof. dr. Hari Kusnanto Josef SU, Dr.Ph.
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities= 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to Management of Medical Data 2. Data and dataflow in hospital, type of data, models of presentation, general ledger, cost accounting, evaluation techniques, budgeting and analysis, material management, inventory control. 3. Introduction to management of health care information systems. 4. Medical data integrity, mapping, and manipulation. 5. Medical data warehousing, Medical data mining and knowledge discover 6. Discussion: Medical data mapping, data structures, clinical terminology, and classification systems. ICD-10, health record content, documentation standards, data management policies and procedures, meaningful use, data sources, and information governance. 7. Connecting EXCEL to External Data Working with EXCEL Formulas and Functions 8. Working with EXCEL Charts and Graphics 9. Data Analysis using Pivot Tables in EXCEL Managing Multiple Worksheets and Workbooks 10. Independent Assignment I : Connecting Tables and Building a Referential Diagram 11. The Relational Model – Entity-Relationship Diagrams 12. Database Implementation – SQL 13. Data Visualization with Tableau 14. Independent Assignment II : Homework Assignments: Data Visualization with Tableau 15. Practical activities → Excel
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Pantanowitz, L., et al. (2012). Pathology informatics : theory & practice. Chicago, Ill., American Society for Clinical Pathology Press. 2. Wager, K. A., et al. (2013). Health care information systems : a practical approach for health care management. San Francisco, Jossey-Bass 3. Database Systems: Design, Implementation and Management, 12 edition, by Coronel & Morris; Cengage Learning, 2017. 4. New Perspectives Microsoft Office 365 & Excel 2016: Comprehensive, 1st edition, by Parsons et al.; Cengage Learning, 2017.

Last modified	Desember 2025.

Biomechanics

Module designation	Providing an understanding of the basics of biomechanics theory in the human body system. Providing the ability to design artificial organ components based on biomechanics principles.
Module level, if applicable	Master
Code	SPSTB212235
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Dr. Eng. Ir. R. Rachmat. A. Sriwijaya,S.T., M.T., D.Eng.
Lecturers	Dr. Eng. Ir. R. Rachmat. A. Sriwijaya,S.T., M.T., D.Eng. Dr. Ardiyanto, S.T., M.Sc., AEP
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Laboratory visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/laboratory visit= 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introductions to biomechanics 2. Principles of Equilibrium: Forces 3. equations of static equilibrium 4. moments and couples 5. structural idealization applications in biomechanics 6. Basics of stress and strain analysis 7. Advanced stress and strain analysis (strain tension transformation) 8. Independent Assignment I: Journal review 9. bending and deflection of beams 10. structural failure and viscoelasticity 11. human gait and motion, bone fracture & fixation 12. whole muscle mechanics parallel versus pinnate muscle types 13. Basic Statics and Movements at Specific Joints: Shoulder and Shoulder Girdle; Elbow and Forearm; Wrist and Hand; Trunk and Spine; Hip, Knee, Ankle; Patterns of movement 14. Independent Assignment II: Presentation 15. Laboratory visit → ergonomics laboratory: motion capture analysis
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Hall, S. (2014). Basic Biomechanics (6th ed.). New York: McGraw-Hill. 2. Hamill, J., Knutzen, K. M., & Derrick, T.R. (2015). Biomechanical basis of human movement (4th ed.). Philadelphia, PA: Lippincott Williams & Wilkins. 3. McLester, J., & Pierre, P. S. (2008). Applied Biomechanics: Concepts and connections. Belmont, CA: Thomson Wadsworth. 4. Neumann, D. A. (2002). Kinesiology of the musculoskeletal system: foundations for physical rehabilitation. Elsevier Health Sciences.
Last modified	Desember 2025.

Artificial Organs

Module designation	Providing an in-depth understanding of the principles, objectives, and developments of artificial organs in the field of health.
Module level, if applicable	Master
Code	SPSTB212236
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Ir. Rini Dharmastiti, M.Sc., Ph.D., IPM, ASEAN Eng.
Lecturers	Ir. Rini Dharmastiti, M.Sc., Ph.D., IPM, ASEAN Eng. Prof. Dr. dr. Budi Yuli Setianto, SpPD(K), SpJP(K) dr. Rahardyan Magetsari, SpOrtho., Ph.D.
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Laboratory Visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Laboratory visit= 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction: principles, construction and control algorithms of artificial organs 2. Heart assist devices : principles, functionality, types of ventricular assist devices (VAD) and total artificial hearts (TAH) 3. Liver artificial support. 4. Hybrid organs 5. Bio-membranes – artificial kidneys 6. Biocompatibility and biomaterials of artificial organ, the immunological problems caused artificial organs application. 7. Prosthetic organ for medical rehabilitation 8. Design and testing of prosthetic organ for medical rehabilitation 9. Regenerative medicine – is it a future of artificial organ? 10. Ethical, economical, environmental and legal aspects in artificial organs domain 11. Discussion: Development and application of artificial organ in Indonesia 12. Independent Assignment I : Journal review 13. Independent Assignment II : Presentation 14. Laboratory visit → Centre for Innovation of Medical Equipment and Devices (*CIMEDs*)
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam..
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Joseph D. Bronsino, Tissue Engineering and Artificial Organs, The Biomedical Engineering Handbook, 2006 2. Gerald Miller, Artificial Organs, 2006 3. Lary Hench, John Jones, Biomaterials, Artificial Organs and Tissue Engineering, 2005
Last modified	Desember 2025.

Layer Manufacturing Technology

Module designation	Providing an understanding of the concepts of layer manufacturing Equipping students with creativity and innovation skills based on methods of object formation using layer manufacturing techniques
Module level, if applicable	Master
Code	SPSTB212237
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Prof. Dr. Eng. Herianto, S.T., M.Eng
Lecturers	Prof. Dr. Eng. Herianto, S.T., M.Eng Dr. Ir. Budi Arifvianto, S.T., M.Biotech
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to layer manufacturing technology 2. General object formation process 3. Drawing and modeling using CAD software 4. Introduction to data formats and data input 5. Solid discrete material-based formation system 6. Liquid material-based formation system 7. Independent Assignment I: journal review 8. Sheet-based solid material forming systems 9. Wire-based solid material forming systems 10. Applications of layer manufacturing technology 11. Optimization of layer manufacturing processes 12. Economic analysis 13. Review of materials and discussion 14. Independent Assignment II: journal review 15. Practical Activities → 3d print machine FDM type
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Pham, D.T., and Dimov, S.S., 2000, rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, Springer. 2. Dr. Eng. Herianto, s.T., M.Eng. dan Ikhwan Taufik, S.Pd., M.Eng., 2018, Overview of 3D Printing Technology, 3. Dr. Eng. Herianto, S.T., M.Eng, Dr. drg. Indra Bramanti, Sp.KGA., M.Sc., Syahirul Alim Ritonga, S.TI, Yarabisa Yanuar, S.T., 2020, 3D Printing for Pandemic Handling, 4. Dr. Eng. Herianto, S.T., M.Eng,Ikhwan Raifik, 2021, Slicing With Ultimaker Cura
Last modified	Desember 2025.

Computer-Aided Design for Medical Devices

Module designation	Providing knowledge about the process of designing medical equipment with the help of computers using engineering design software.
Module level, if applicable	Master
Code	SPSTB212238
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Ir. I Gusti Bagus Budi Dharma, S.T., M.Eng., Ph.D., IPM., ASEAN Eng
Lecturers	Ir. I Gusti Bagus Budi Dharma, S.T., M.Eng., Ph.D., IPM., ASEAN Eng‘ Dr. Ir. Urip Agus Salim, S.T., M. Eng
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Fundamentals of technical drawing 2. Introduction to technical drawing standards and notation: alignment marks, tolerances 3. Introduction to CAD software for modeling: 1 4. Introduction to CAD software for modeling: 2 5. Computer-aided 2D design drawing 6. Computer-aided 3D solid part/component design: 1 7. Computer-aided 3D solid part/component design: 2 8. Independent assignment I: part/component design exercises 9. Component assembly process 10. Independent exercises 11. Independent exercises 12. Independent exercises 13. Independent assignment II: simple medical equipment design 14. Practical Activities → softwar CAD, 3D Solid
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Madsen, D.A. and Madsen, D.P., 2011, Engineering Drawing and Design, 5th ed., Cengage Learning, New York. 2. Giesecke, F.E., Hill, I.L., Spencer, H.C., Mitchell, A.E., Dygdon, J.T., Novak, J.E., Lockhart, S.E. and Goodmand, M., 2011, Technical Drawing with Engineering Graphics, 14th ed., Peachpit Press.
Last modified	Desember 2025.

Animal Models in Biomedical Research

Module designation	Providing an understanding of laboratory animals in biomedical research, in terms of ethics, regulations, handling, and laboratory management. Providing an understanding of modeling and the types of laboratory animals suitable for biomedical engineering research.
Module level, if applicable	Master
Code	SPSTB212239
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Prof. drh. Agustina Dwi WIjayanti
Lecturers	Prof. drh. Agustina Dwi Wijayanti drh. Imron Rosyadi, M.Sc., Ph.D Ida Fitriana, S.Farm., Apt., M.Sc., Ph.D
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Laboratory visit

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/laboratory visit = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Using animals in biomedical research: why education holds the key 2. Animal models in biomedical research - ethical concerns 3. Basic animal handling technique 4. Biohazards & environmental safety 5. Factors that can influence animal research 6. Anesthesia, analgesia and aseptic technique, animal monitoring, euthanasia methods & recordkeeping 7. Selection of animal model 8. Methodologies for the molecular, biochemical, cellular and genetic analyses in studies with model organisms 9. Animal models for cancer 10. Animal models for infectious diseases 11. Chicken and mouse as model organisms 12. Other model organisms: E. coli, C. elegans, D. melanogaster, zebra fish, non-human primates 13. In vivo, non-invasive, imaging systems and their applications in animal experimentation, computer modelling 14. Designing experimental approaches using experimentation animals to study pathologies or physiological processes in biomedicine. 15. Laboratory practice → Pharmacology laboratory: animal handling and application of drugs on experimental animals
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Ibeh, B., 2018, Experimental Animal Models of Human Diseases: An Effective Therapeutic Strategy. London, UK : IntechOpen
Last modified	Desember 2025.

Lean Health Care Systems

Module designation	Providing an understanding of lean in healthcare systems (hospitals), concepts, methodologies, and benefits
Module level, if applicable	Master
Code	SPSTB212240
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Dr. Eng. Ir. Muh. Arif Wibisono, S.T., M.T., IPM., ASEAN Eng.
Lecturers	Dr. Eng. Ir. Muh. Arif Wibisono, S.T., M.T., IPM., ASEAN Eng. Dr. drg. Julita Hendrartini, M.Kes Ir. Achmad Pratama Rifai, S.T., M.Eng, Ph.D
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/practical activity = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to Lean Health care 2. Lean definition and concept 3. Organizational capabilities for lean 4. Value and waste 5. Observing the process and value stream 6. Standardized Work as a Foundation of Lean 7. Lean Methods: Visual Management, 5S, and Kanban 8. Proactive Root Cause Problem Solving 9. Getting started with lean 10. Case study in lean hospital 11. Group assignment: presentation 12. Independent assignment I: oral presentation 13. Independent assignment II: oral presentation 14. Practical activity → Visual management, 5S
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Graban, M, 2012, Lean Hospitals, Improving Quality, Patient Safety, and Employee Engagement, Taylor & Francis Group, CRC 2. White, B., 2016, Lean daily management for healthcare: A strategic guide to implementing lean for hospital leaders, CRC Press 3. Grunden, N and Hagood, C., 2012, Lean-Led Hospital Design, creating the efficient hospital of the future, Taylor & Francis Group
Last modified	November 2025.

Supply Chain Management in Health Care Systems

Module designation	Providing understanding and skills to design logistics and supply chain systems in the healthcare system
Module level, if applicable	Master
Code	SPSTB212241
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Ir. Nur Mayke Eka Normasari, S.T., M.Eng., Ph.D., IPM., ASEAN Eng.
Lecturers	Ir. Nur Mayke Eka Normasari, S.T., M.Eng., Ph.D., IPM., ASEAN Eng. Ir. Anna Maria Sri Asih, S.T., M.M., M.Sc., Ph.D., IPU., ASEAN Eng.
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activity

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activity= 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to Supply Chain Management in Healthcare Systems 2. Characteristics and Challenges of Healthcare Supply Chains 3. Demand Forecasting and Medical Device Inventory Management 4. Medicine and Consumable Medical Supplies Inventory Management 5. Healthcare Logistics Network Design (Facilities, Distribution, Transportation) 6. Procurement and Supplier Management in the Healthcare Sector 7. Independent Assignment I: Journal Review and Discussion 8. Risk Management and Resilience in Healthcare Supply Chains 9. Cold Chain and Logistics for Sensitive Biomedical Products 10. Healthcare Supply Chain Modeling and Simulation 11. Performance Evaluation and Key Performance Indicators (KPIs) in Healthcare Logistics 12. Material Review and Case Discussion 13. Independent Assignment II: Project Presentation / Oral Presentation 14. Practical Activities → Healthcare supply chain modeling & simulation
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Goetschalckx, M., 2011, Supply Chain Engineering, Springer 2. Shapiro, J.F., 2001, Modeling the Supply Chain, Duxbury, Thomson Learning
Last modified	Desember 2025.

Inventory and Logistics Control in Health Care System

Module designation	Providing an understanding of the basic concepts of logistics and inventory in healthcare systems. Being able to understand the basic concepts of logistics and inventory in healthcare systems and apply them to solve problems in the field of biomedical engineering.
Module level, if applicable	Master
Code	SPSTB212242
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Ir. Anna Maria Sri Asih, S.T., M.M., M.Sc., Ph.D., IPU., ASEAN Eng.
Lecturers	Ir. Anna Maria Sri Asih, S.T., M.M., M.Sc., Ph.D., IPU., ASEAN Eng. Dr. dr. Andreasta Maliala, DPH., M.Kes., MAS.
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activity

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to Logistic and Inventory in Health care System 2. Benchmarking logistic performance 3. Distribution 4. International logistics 5. Controlling logistics cost 6. Logistics management and strategy 7. Independent Assignment I: review journal 8. Software and technology 9. Warehouse management 10. Inventory management 11. Review of material and discussion 12. Independent Assignment II: review journal 13. Independent Assignment III: oral presentation 14. Practical Activity → software for logistic & inventory
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	Donath, Bob; Joe Mazel and Cindy Dubin; Patterson, Perry; 2002; The IOMA: Handbook of Logistics and Inventory Management; John Wiley & Sons, Inc., New York.
Last modified	Desember 2025.

Modelling and Optimization of Health Care Systems

Module designation	Providing an understanding of modeling and optimization in healthcare systems (hospitals), concepts, methodologies, and benefits Able to understand the basic concepts of modeling and optimization in healthcare systems (hospitals), methodologies, and benefits
Module level, if applicable	Master
Code	SPSTB212244
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd/Even semester
Person responsible for the module	Prof. Ir. Nur Aini Masruroh, ST, M.Sc., Ph.D., IPU, ASEAN Eng.
Lecturers	Prof. Ir. Nur Aini Masruroh, ST, M.Sc., Ph.D., IPU, ASEAN Eng. Dr. Drg. Yulita Hendratini
Language	Indonesian & English
Relation to curriculum	Elective course
Type of teaching, contact hours	This course is planned to have 14 teaching weeks and 2 weeks of examination. several types of teaching conducted: - Classic tutorial, - Case-study learning, - Discussion - Practical Activities

Workload	This course is planned to have 13 teaching weeks, 1 week lab visit, and 2 weeks of examination. Lectures = 3 SKS x 50 minutes x 15 meetings = 2250 minutes = 37.5 hours = 37.5 hours/25 hours =1.5 ECTS Experiment/Practical Activities = 3 SKS x 60 minutes x 1 meeting = 180 minutes = 3 hours = 3/25 hours = 0.12 ECTS Assigment = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Self Study = 3 SKS x 60 minutes x 16 meetings = 2880 minutes = 48 hours = 48 hours/ 25 hours =1.92 ECTS Total workload = 5.46 ECTS
Credit points	3 SKS (5.46 ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team.

Content	1. Introduction to Modelling & optimization in Healthcare system 2. Basic concepts of modelling and systems thinking 3. System characterization 4. Combinatorial optimization models 5. System optimization concepts 6. Linear programming 7. Integer programming 8. Queuing theory and metaheuristics fundamentals 9. Case studies: scheduling (operating rooms, nurse rostering, appointment scheduling) 10. Queuing system analysis in hospitals 11. Group assignment: presentation 12. Independent assignment I: oral presentation 13. Independent assignment II: oral presentation 14. Practical Activities → Software for operation research
Study and examination requirements and forms of examination	Classes are conducted with 80% classic tutorial and 20% case study/project based presentation. Exams are done by written exam and/or task-based exam.
Media employed	PowerPoint, LMS (eLok, Google Classroom, etc.), and online meeting platform (Zoom, Gmeet, etc.)
Reading list	1. Murthy, D.N.P. , Page, N.W., and Rodin, E.Y., 1990, Mathematical Modeling, 1st edition, Pergamon Press 2. Williams, H.P., 1999, Model Building in Mathematical Programming, 4 ed., John Wiley and Sons, West Sussex 3. Hillier, F.S. and Lieberman, G.J., 2014, Introduction to Operations Research, 10th ed., McGraw-Hill International Edition
Last modified	Desember 2025.

Thesis

Module designation	Research in accordance with the research plan that has been tested at the proposal seminar. This course meeting is conducted in a regular meeting in offline/online form, as a form of thesis guidance from the supervising lecturer at UGM and field supervisors (at the workplace).
Module level, if applicable	Master
Code	SPSTB212499 (Reguler Programme) SPSTB232499 (By-Research Programme)
Subtitles, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Even and Odd semester
Person responsible for the module	Respective Thesis Supervisors.
Lecturers	Thesis Supervisors.
Language	Indonesian & English
Relation to curriculum	Compulsory course
Type of teaching, contact hours	Discussion.

Workload	Workload calculation • Writing proposal = 7 hours x 5 days x 4 weeks = 140 hours • Proposal seminar = 4 hours • Revision of proposal = 7 hours x 5 days x 2 weeks = 70 hours • Experiment or Data collection, etc = 7 hours x 5 days x 12 weeks =420 hours • Writing thesis = 7 hours x 5 days x 10 weeks = 350 hours • Thesis result seminar = 4 hours • Revision of theis after seminar = 7 hours x 5 days x 2 weeks = 70 hours • Thesis examination = 4 hours • Revision of thesis = 7 hours x 5 days x 3 weeks = 105 hours • Publication (research article) = 7 hours x 5 days x 2 weeks = 70 hours • Publication (poster) = 10 hours Total workload = 1247 hours/ 25 hours = 49.88 ECTS
Credit points	49.88 ECTS
Requirements according to the examination regulations	-
Recommended prerequisites	-
Module objectives/intended learning outcomes	PLO 1: Able to use knowledge in the fields of engineering, health, and biology to analyze problems in the field of biomedical engineering globally that are relevant to public needs. PLO 2: Able to design research related to artificial organs and medical instrumentation. PLO 3: Able to test and analyze relevant design results in biomedical engineering field. PLO 4: Able to communicate and work effectively in a multi-disciplinary team. PLO 5: Able to convey the results of work in the field of biomedical engineering in writing orally or verbally PLO 6: Able to demonstrate professionalism and adhere to principles bioethics. PLO 7: Able to develop oneself sustainably and adapt to developments in science and technology biomedical technology

Content	Thesis consultation to respective thesis supervisors.
Study and examination requirements and forms of examination	Course is conducted with 100% thesis discussion per meeting. Exams are done by oral/presentation examination.
Media employed	Online meeting platform (Zoom, Gmeet, etc.)
Reading list	-
Last modified	November 2025.