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.
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