MODULE HANDBOOK
MEDICAL INFORMATION MANAGEMENT

BACHELOR DEGREE PROGRAM
DEPARTMENT OF BIOMEDICAL ENGINEERING
FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS TECHNOLOGY

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

ENDORSEMENT PAGE

MODULE HANDBOOK
Medical Information Management
DEPARTMENT OF BIOMEDICAL ENGINEERING
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
Number : 6866/IT2.IX.5.1.2/B/PP.03.00.00/2023

Proses ***Process***	**Penanggung Jawab** ***Person in Charge***			**Tanggal** ***Date***
	Nama ***Name***	**Jabatan** ***Position***	**Tandatangan** ***Signature***	
Perumus *Preparation*	Eko Agus Suprayitno, S.Si, M.T.	Dosen *Lecturer*		**November 18, 2022**
Pemeriksa dan Pengendalian *Review and Control*	Dr. Tri Arief Sardjono, S.T., M.T.	Tim kurikulum *Curriculum team*		**November 20, 2022**
Persetujuan *Approval*	Ir. Josaphat Pramudijanto, M.Eng.	Koordinator RMK *Course Cluster Coordinator*		**April 13, 2023**
Penetapan *Determination*	Dr. Achmad Arifin, S.T., M.Eng.	Kepala Departemen *Head of Department*		**April 17, 2023**

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MODULE HANDBOOK
MEDICAL INFORMATION MANAGEMENT

Module name	**Medical Information Management**	
Module level	Undergradute	
Code	EB234910	
Course (if applicable)	Medical Information Management	
Semester	Specialization	
Person responsible for the module	Nada Fitrieyatul Hikmah, S.T., M.T.	
Lecturer	Dr. Norma Hermawan	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergradute degree program, **specialization**.	
Type of teaching, contact hours	Lectures, <60 students	
Workload	1. Lectures : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments : 3 x 50 = 150 minutes per week. 3. Private learning : 3 x 50 = 150 minutes per week.	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.	
Mandatory prerequisites	-	
Learning outcomes and their corresponding PLOs	Course Learning Outcome (CLO) after completing this module, CLO 1: Students understand and able to explain the basic concepts of medical information management. CLO 2: Students understand and able to explain the classification and representation of medical data. CLO 3: Students understand and able to explain the basic concepts of numbering systems and medical data storage and its application. CLO 4: Students know, understand and able to explain legal aspects and the latest development of medical information management. CLO 5: Student understand and able to explain concept of network and data communication.	PLO-02 PLO-06 PLO-09

	CLO 6: Students must be able to develop network communication program. CLO 7: Student must be able to explain error detection and correction techniques CLO 8: Student must be able to explain data encription techniques	
Content	Medical Information Management course aims to provide an understanding of basic concepts of information management and its application in the medical field, classification and representation of medical data, medical archiving, ethics and law as well as the latest developments in the medical information management system. Students are expected to be able to implement this knowledge in practice with network programming, error coding and data encription in order to develop a medical management system.	
Study and examination requirements and forms of examination	• In-class exercises • Written assignment 1, 2, 3, 4 and 5 • Mid-term examination • Project based assignment and presentation • Final examination	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	Main : 1. Ira J. Kalet, “Principles of Biomedical Informatics, Second Edition”, Academic Press, 2014 2. Joseph Tan, “Adaptive Health Management Information Systems : Concepts, Cases, & Practical Applications”, Jones & Bartlett Publishers, 2010 3. Edward H. Shortliffe, James J. Cimino, “Biomedical Informatics, Computer Applications in Health Care and Biomedicine, Third Edition”, Springer, 2006 4. Joseph D. Bronzino, “The Biomedical Engineering Handbook, Second Ed.” CRC Press, 2000 5. M. Beth Shanholtzer and Gary Ozanich, ”Health Information Management and Technology, 1st Edition”, McGraw-Hill, 2016 6. Pradeep Sinha, Gaur Sunder, Prashant Bendale, Manisha Mantri, Atreya Dande, “Electronic Health Record : Standards, Coding Systems, Frameworks, and Infrastructures”, John Wiley & Sons, 2012 7. Charlie Kaufman, Radia Perlman, Mike Speciner “Network Security: Private Communication in a Public World, Second Ed.”, Pearson, 2017 8. Todd K. Moon, “Error Correction Coding: Mathematical Methods and Algorithms”, Wiley, 2005	

	9. Neil Matthew, Richard Stones, “Beginning Linux Programming, 4th Edition”, Wiley, 2007 10. Mary Jo Bowie, “Essentials of Health Information Management: Principles and Practices, 4th Edition”, Cengage 2018 11. Davis, Gordon B. dan Margarethe H. Olson, “Management Information System: Conceptual Foundations, Structure and Development, Second edition”, Tokyo, McGraw-Hill Kogakusha, 1984 12. Terese Claeys, “Medical Filing”, Cengage Learning, 1996

I. Rencana Pembelajaran Semester / *Semester Learning Plan*

	INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) **FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS TECHNOLOGY** **DEPARTMENT OF BIOMEDICAL ENGINEERING**	**Document Code**

SEMESTER LEARNING PLAN

MATA KULIAH (MK) ***COURSE***	**KODE** ***CODE***	**Rumpun MK** ***Course Cluster***	**BOBOT (sks)** **Credits**		**SEMESTER**	**Tgl Penyusunan** ***Compilation Date***
Manajemen Informasi Medika ***Medical Information Management***	EB234910	Teknik Biomedik *Biomedical Engineering*	T=3	P=0	Peminatan *Specialization*	Nov 19, 2022
OTORISASI / PENGESAHAN ***AUTHORIZATION / ENDORSEMENT***	**Dosen Pengembang RPS** ***Developer Lecturer of Semester Learning Plan***		**Koordinator RMK** ***Course Cluster Coordinator***		**Ka DEPARTEMEN** ***Head of Department***	
	(Nada Fitrieyatul Hikmah, S.T, M.T)		**(Dr. Norma Hermawan)**		**(Dr. Achmad Arifin, S.T., M.Eng.)**	

Capaian Pembelajaran ***Learning Outcomes***	**CPL-PRODI yang dibebankan pada MK** ***PLO Program Charged to The Course***	
	CPL-02 *PLO-02*	Mampu **menemukan**, **memahami**, **menjelaskan**, **merumuskan**, dan **menyelesaikan** permasalahan umum pada bidang Teknik dan permasalahan khusus pada bidang Teknik Biomedika yang meliputi instrumentasi biomedika cerdas, teknik rehabilitasi medika, pencitraan dan pengolahan citra medika, serta informatika medika. *Able to **find**, **understand**, **explain**, **formulate**, and **solve** general problems in the field of Engineering and special problems in the field of Biomedical Engineering which includes intelligent biomedical instrumentation, medical rehabilitation techniques, imaging and processing of medical images, and medical informatics.*
	CPL-06 *PLO-06*	Mampu **menerapkan** ilmu pengetahuan, keterampilan, dan metode terkini dalam menyelesaikan permasalahan di bidang Teknik Biomedika. *Able to **apply** the latest knowledge, skills and methods in solving problems in the field of Biomedical Engineering.*
	CPL-09	Mampu **mengetahui**/**mengikuti** perkembangan terkini dibidang ilmu pengetahuan dan teknologi serta **menyikapinya secara obyektif** dengan mengedepankan nilai-nilai kebenaran universal.

	PLO-09	Able to **know** / **follow** the latest developments in the field of science and technology and to **react objectively** by promoting the values of universal truth
	Capaian Pembelajaran Mata Kuliah (CPMK) ***Course Learning Outcome (CLO) - If CLO as description capability of each Learning Stage in the course, then CLO = LLO***	
	CP MK 1 ***CLO 1***	Mahasiswa memahami dan mampu menjelaskan tentang konsep dasar manajemen informasi medika. *Students understand and able to explain the basic concepts of medical information management.*
	CP MK 2 ***CLO 2***	Mahasiswa memahami dan mampu menjelaskan tentang klasifikasi dan representasi data medis. *Students understand and able to explain the classification and representation of medical data.*
	CP MK 3 ***CLO 3***	Mahasiswa memahami dan mampu menjelaskan tentang konsep dasar sistem penomoran dan penyimpanan data medis serta penerapannya. *Students understand and able to explain the basic concepts of numbering systems and medical data storage and its application.*
	CP MK 4 ***CLO 4***	Mahasiswa mengetahui, memahami dan mampu menjelaskan tentang aspek hukum dan perkembangan terkini dari manajemen informasi medika. *Students know, understand and able to explain legal aspects and the latest development of medical information management.*
	CP MK 5 ***CLO 5***	Mahasiswa memahami dan mampu menjelaskan konsep jaringan dan data komunikasi. Student understand and able to explain concept of network and data communication.
	CP MK 6 ***CLO 6***	Mahasiswa mampu mengembangkan pemrograman komunikasi jaringan. Students must be able to develop networ programming.
	CP MK 7 ***CLO 7***	Mahasiswa mampu menjelaskan teknik deteksi dan koreksi error. Student must be able to explain error detection and correction techniques.
	CP MK 8 ***CLO 8***	Mahasiswa mampu menjelaskan teknik enkripsi data. Student must be able to explain data encription techniques.

Peta CPL – CP MK

Map of PLO - CLO

	CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07	CPL-08	CPL-09	CPL-10	CPL-11	CPL-12
CPMK 1 / SUB CPMK 1 *CLO 1 / LLO 1*		√										
CPMK 2 / SUB CPMK 2 *CLO 2 / LLO 2*		√										
CPMK 3 / SUB CPMK 3 *CLO 3 / LLO 3*						√						
CPMK 4 / SUB CPMK 4 *CLO 4 / LLO 4*									√			
CPMK 5 / SUB CPMK 5 *CLO 5 / LLO 5*						√						
CPMK 6 / SUB CPMK 6 *CLO 6 / LLO 6*						√						
CPMK 7 / SUB CPMK 7 *CLO 7 / LLO 7*									√			
CPMK 8 / SUB CPMK 8 *CLO 8 / LLO 8*									√			

Diskripsi Singkat MK

Mata kuliah Manajemen Informasi Medika bertujuan untuk memberikan pemahaman tentang konsep dasar manajemen informasi dan penerapannya dalam dunia medis, klasifikasi dan representasi data medis, pengarsipan medis, etika dan hukum serta perkembangan terkini dari sistem manajemen informasi medika. Mahasiswa diharapkan mampu mengimplementasikan pengetahuan tersebut dalam pengembangan manajemen informasi dalam dunia medis dengan mempertimbangkan integritas dan keamanan data.

Short Description of Course

Medical Information Management course aims to provide an understanding of basic concepts of information management and its application in the medical field, classification and representation of medical data, medical archiving, ethics and law as well as the latest developments in the medical information management system. Students are expected to be able to implement this knowledge in developing information management in the medical field with guaranted data integrity and security.

Bahan Kajian:
Materi pembelajaran

1. Konsep *Health Management Information System (HMIS) / Health Management Information System (HMIS) Concepts*
2. Klasifikasi data rawat inap, rawat jalan, manajemen riwayat kesehatan dan rujukan dari dokter / *Data classification of inpatient, outpatient, medical history management and referrals from doctors*

Course Materials:	3. Sistem penomoran dan penyimpanan data / *Numbering and data storage system* 4. Aspek hukum dari *Health Management Information System* / *Legal aspects of Heatlh Management Information System* 5. Konsep dan penerapan komunikasi dan jaringan data biomedika/ *Concept and application of biomedical data communication and network* 6. Pemrograman komunikasi jaringan / *Network communication programming* 7. Teknik deteksi dan koreksi error data / *Error detection and correction techniques* 8. Keamanan data Biomedika / *Biomedical data security*
Pustaka ***References***	**Utama / *Main*:** 1. Ira J. Kalet, Ph.D., "Principles of Biomedical Informatics Second Edition", Elsevier Inc., 2014. 2. Joseph Tan, "Adaptive Health Management Information Systems : Concepts, Cases, & Practical Applications", Jones & Bartlett Publishers, 2010 3. Edward H. Shortliffe, James J. Cimino, "Biomedical Informatics, Computer Applications in Health Care and Biomedicine, Third Edition", Springer, 2006 4. Pradeep Sinha, Gaur Sunder, Prashant Bendale, Manisha Mantri, Atreya Dande, "Electronic Health Record : Standards, Coding Systems, Frameworks, and Infrastructures", John Wiley & Sons, 2012 5. Davis, Gordon B. dan Margarethe H. Olson, "Management Information System: Conceptual Foundations, Structure and Development, Second edition", Tokyo, McGraw-Hill Kogakusha, 1984 6. Todd K. Moon, "Error Correction Coding: Mathematical Methods and Algorithms", John Wiley & Sons, 2005 7. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security: Private Communication in a Public World", Pearson, 2017 **Pendukung / *Supporting*:** 1. Neil Matthew, Richard Stones, "Beginning Linux Programming, 4th Edition", Wiley, 2007 2. Joseph D. Bronzino, "The Biomedical Engineering Handbook, Second Ed." CRC Press, 2000 3. M. Beth Shanholtzer and Gary Ozanich, "Health Information Management and Technology, 1st Edition", McGraw-Hill, 2016 4. Terese Claeys, "Medical Filing", Cengage Learning, 1996 5. Mary Jo Bowie, "Essentials of Health Information Management: Principles and Practices, 4th Edition", Cengage 2018
Dosen Pengampu	Dr. Norma Hermawan

Lecturers	
Matakuliah syarat ***Prerequisite***	Dasar Sistem Komunikasi Dasar Pemrograman

Mg ke/ ***Week***	**Kemampuan akhir tiap tahapan belajar (Sub-CPMK) /** ***Final ability of each learning stage (LLO)***	**Penilaian /** ***Assessment***		**Bantuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa; [Estimasi Waktu] /** ***Form of Learning; Learning Method; Student Assignment; [Estimated Time]***		**Materi Pembelajaran [Pustaka] /** ***Learning Material [Reference]***	**Bobot Penilaian /** ***Assess-ment Load*** **(%)**
		Indikator / ***Indicator***	**Kriteria & Teknik /** ***Criteria & Techniques***	**Tatap Muka /** ***In-class*** **(5)**	**Daring /** ***Online*** **(6)**		
(1)	**(2)**	**(3)**	**(4)**			**(7)**	**(8)**
1 - 2	Mahasiswa memahami dan mampu menjelaskan tentang konsep dasar manajemen informasi medika. *Students understand and able to explain the basic concepts of medical information management.*	• Mampu menjelaskan HMIS, *Health information exchange,* dan konsep sistem dan informasi. • *Able to explain HMIS, Health information*	**Non-tes :** **Tugas 1:** Tugas mengenai konsep dasar MHIS dan aplikasi aplikasi GIS dalam HMIS. (Tugas Tertulis) ***Non-test :*** ***Assignment 1:***	• Kuliah dan diskusi. [TM : 1 x 3 x 50”] [BM : 1 x 3 x 50”] [PT : 1 x 3 x 50”]	• Belajar mandiri melalui Share ITS dan myITSClassroom. • *Self learning through Share ITS and myITSClassroom.*	• *Health Management Information System* (HMIS): pengenalan tentang definisi, sejarah dan evolusi HMIS, manfaat, fungsi dan komponen dasar HMIS (komponen	**Tugas 1 /** ***Assignment 1*****: 5%**

		exchange and system and information concepts.	*About the basic concepts of MHIS and the GIS application in HMIS.* *(Written Assignments)*	• *Lecturers and Discussions.* *[FF : 1 x 3 x 50”]* *[SA : 1 x 3 x 50”]* *[SS : 1 x 3 x 50”]*		data, informasi, pengetahuan; komponen hardware, software, network; komponen proses, task, system; komponen integration, interoperability; komponen user, administration, management; serta hubungan tiap komponenn) • *Health information exchange* • Konsep sistem dan informasi: (pengertian sistem, karakteristik sistem, jenis-jenis sistem, model sistem, konsep fakta, data dan informasi, karakteristik kualitas informasi, komponen sistem informasi	

						• Pengenalan *Geographical Information System* (GIS) dalam HMIS : komponen GIS, data spasial, sumber data, manajemen data dan contoh aplikasi **[Link materi di MyITSClassroom]** • *Health Management Information System (HMIS): introduction to the definition, history and evolution of HMIS, benefits, functions and basic components of HMIS (data components, information, knowledge; hardware, software, network components; process*	

						components, tasks, systems; integration, interoperability components ; user, administration, management components; and the relationship of each component) • *Health information exchange* • *Systems and information concepts: (understanding systems, system characteristics, types of systems, system models, concepts of facts, data and information, information quality characteristics, information system components* • *Introduction to Geographical Information System (GIS) in*	

						HMIS: GIS components, spatial data, data sources, data management and application examples	
3	Mahasiswa memahami dan mampu menjelaskan tentang klasifikasi dan representasi data medis. *Students understand and able to explain the classification and representation of medical data.*	• Mampu mengklasifikasin dan merepresentasikan data medis. • Mampu merancang aplikasi rekam medis. • *Able to classify and represent medical data.* • *Able to design medical record applications.*	**Non-tes :** **Tugas 2:** Klasifikasi dan representasi data medis dan perancangan aplikasi rekam medis (Tugas Tertulis). ***Non-test :*** ***Assignment 2:*** *Medical data classification and representation and the design of medical record application. (Written Assignments)*	• Kuliah dan diskusi. [TM : 1 x 3 x 50”] [BM : 1 x 3 x 50”] [PT : 1 x 3 x 50”] • *Lecturers and Discussions.* *[FF : 1 x 3 x 50”]* *[SA : 1 x 3 x 50”]* *[SS : 1 x 3 x 50”]*		• Klasifikasi dan representasi data medis: pengenalan tentang data medis, representasi data dan informasi, rekam medis (metode pengambilan dan pengumpulan data) • Standar klasifikasi WHO (penyakit, intervensi kesehatan, disabbilitas) • Klasifikasi data rawat inap, rawat jalan, manajemen riwayat kesehatan	**Tugas 2 / *Assignment 2*: 10%**

						dan rujukan dari dokter • Teknik perancangan aplikasi rekam medis • *Medical data classification and representation: introduction to medical data, data and information representation, medical records (data collection and collection methods)* • *WHO classification standards (disease, health interventions, disabilities)* • *Inpatient, outpatient data classification, medical history management and doctor referrals* • *Medical record application design techniques*	

4	Mahasiswa memahami dan mampu menjelaskan tentang konsep dasar sistem penomoran dan penyimpanan data medis serta penerapannya. *Students understand and able to explain the basic concepts of numbering systems and medical data storage and its application.*	• Mampu menerapkan sistem penomoran dan penyimpanan data medis. • *Able to implement a medical data numbering and storage system.*	**Non-tes :** **Tugas 3:** konsep dasar sistem penomoran dan penyimpanan data medis serta penerapan standar koding, klasifikasi dan terminologi medis pada rekam medis (Tugas Tertulis) ***Non-test :*** ***Assignment 3:*** *Basic concepts of medical data storage and numbering system and application in coding standards, classification and medical terminology on medical records.. (Written Assignments)*	• Kuliah dan diskusi. [TM : 1 x 3 x 50”] [BM : 1 x 3 x 50”] [PT : 1 x 3 x 50”] • *Lecturers and Discussions.* *[FF : 1 x 3 x 50”]* *[SA : 1 x 3 x 50”]* *[SS : 1 x 3 x 50”]*		• Sistem penomoran dan penyimpanan data medis: pengenalan tentang pengarsipan medis (*medical filing*), pengenalan tentang berbagai macam standar data, penomoran (koding), klasifikasi dan terminologi medis, penggunaan standar koding, klasifikasi dan terminologi medis pada rekam medis, instrument atau tool untuk identifikasi koding serta pemanfaatan untuk pengembangan sistem informasi dan pelayanan kesehatan. • *Medical numbering and storage system:*	**Tugas 3 / *Assignment 3*: 5%**

						introduction to medical filing , introduction to various kinds of data standards, numbering (coding), medical classification and terminology, use of coding standards, medical classification and terminology in medical records, instruments or tools for identification coding and utilization for the development of information systems and health services.	
5	Mahasiswa mengetahui, memahami dan mampu menjelaskan tentang aspek hukum dan perkembangan terkini dari manajemen informasi medika.	• Mampu menjelaskan aspek hukum dan perkembangan HMIS.	**Non tes:** **Tugas 4:** Tugas mengenai aspek hukum dan perkembangan terkini dari HMIS (Tugas Tertulis)	• Kuliah dan diskusi. [TM : 1 x 3 x 50”] [BM : 1 x 3 x 50”] [PT : 1 x 3 x 50”]		• Aspek hukum dan perkembangan terkini dari HMIS: pengenalan tentang hukum kesehatan, kebijakan hukum (*legal policy*) dan fungsi regulasi serta	**Tugas 4 / *Assignment 4*: 5%**

	Students know, understand and able to explain legal aspects and the latest development of medical information management.	• *Able to explain legal aspecst and development of HMIS.*	***Non-test:*** ***Assignment 4:*** *About legal aspects and the latest developments of HMIS.* *(Written Assignments)*	• *Lecturers and Discussions.* *[FF : 1 x 3 x 50”]* *[SA : 1 x 3 x 50”]* *[SS : 1 x 3 x 50”]*		interpretasinya, relevansi dan interaksi antara hukum dengan sistem informasi dan pelayanan kesehatan khususnya di Indonesia, penggunan dan perkembangan terkini HMIS khususnya di Indonesia • *Legal aspects and current developments of HMIS: introduction to health law, legal policies and regulatory functions and their interpretations, relevance and interaction between law and information systems and health services, especially in Indonesia, usage*	

						and current developments of HMIS, especially in Indonesia.	
6	Mahasiswa memahami dan mampu menjelaskan konsep jaringan dan komunikasi data biomedika *Student understand and able to explain concept of biomedical data and network*	• Mampu menjelaskan konsep jaringan dan komunikasi data biomedika • Mampu menjelaskan konsep standar protokol HL7 • Mampu menjelaskan standar protokol DICOM • *Able to explain concept of biomedical data and network* *.* • *Able to explain concept of HL7 standard protocol* *.*	**Non-tes :** **Tugas 5:** Tugas mengenai konsep jaringan dan komunikasi data biomedika, serta protokol HL7 dan DICOM (Tugas Tertulis) ***Non-test :*** ***Assignment 5:*** *Basic concepts of biomedical data communication network and the HL7 and DICOM protocol. (Written Assignments)*	• Kuliah dan diskusi. [TM : 1 x 3 x 50”] [BM : 1 x 3 x 50”] [PT : 1 x 3 x 50”] • *Lecturers and Discussions.* *[FF : 1 x 3 x 50”]* *[SA : 1 x 3 x 50”]* *[SS : 1 x 3 x 50”]* •		• Konsep jaringan dan komunikasi data: pengenalan tentang OSI layer, komunikasi TCP-IP pengenalan tentang arsitektur client-server. • Konsep protokol komunikasi data medis dan paket data, sejarah perkembangan dan penggunaan protokol komunikasi data medis serta standar komunikasi dengan protokol HL7 dan DICOM. • *The concept of network and data communication: an introduction to the OSI layer, TCP-IP communication an*	**Tugas 5 / *Assignment 5*: 5%**

		• *Able to explain concept of DICOM standard protocol.*				*introduction to the client-server architecture.* • *The concept of medical data communication protocols and data packets, the history of the development and use of medical data communication protocols and communication standards with the HL7 and DICOM protocols.*	
7	Mahasiswa mampu mengimplementasi pemrograman socket *Student able to implement socket programming*	• Mampu mengimplementasi pemrograman socket • *Able to implement socket programming*	**Non tes:** **Mini Project**: Penentuan tema mini project diberikan pada minggu ke – 9. Proses presentasi dilakukan pada minggu ke – 14-15 (Demo program) ***Non-test:*** ***Mini Project:*** *Defining the theme of the presentation is*	• Kuliah dan diskusi. [TM : 2 x 3 x 50”] [BM : 2 x 3 x 50”] [PT : 2 x 3 x 50”] • *Lecturers and Discussions.* *[FF : 2 x 3 x 50”]* *[SA : 2 x 3 x 50”]*		• Konsep client-server dan socket, serta mempraktikkan penggunaan socket Unix API, PHP API, Python API dan metode pemrograman socket lintas platform. • *Client-server and socket concepts, as*	**Tugas 7 / *Assignment 7*: 5%** **Proyek Mini / *Mini***

			given in week 9. The presentation is carried out on week 14 – 15. (Presentation Assignment)	*[SS : 2 x 3 x 50”]* •		*well as practicing the use of Unix API sockets, PHP APIs, Python APIs and cross-platform socket programming methods.*	***Project*: 20%**
8	**EVALUASI TENGAH SEMESTER** ***MID-SEMESTER EXAM***						**20**
9-11	Mahasiswa mampu menjelaskan berbagai teknik koding data untuk deteksi dan koreksi error serta mengimplementasikannya dalam program sederhana *Student able to explain different types of data coding for error detection and correction as well as implementing it in a program*	• Mampu menjelaskan metode dasar untuk deteksi dan koreksi error, serta prinsip penambahan bit parity • Mampu menjelaskan skema pengkodean data untuk pencegahan kesalahan • Mampu menerangkan prinsip kerja CRC • *Able to explain basic methods for*	**Non-tes :** **Tugas 6:** Konsep dasar deteksi dan koreksi error dan penambahan bit parity (Tugas Tertulis) **Tugas 7:** Skema pengkodean data lanjutan, CRC dan dekoding (Tugas Program) ***Non-test :*** ***Assignment 6:*** *Basic concepts of medical data storage and numbering system and its application.*	• Kuliah dan diskusi. [TM : 3 x 3 x 50”] [BM : 3 x 3 x 50”] [PT : 3 x 3 x 50”] • *Lecturers and Discussions.* *[FF : 3 x 3 x 50”]* *[SA : 3 x 3 x 50”]* *[SS : 3 x 3 x 50”]*		• Aljabar Modulo-2, metode dasar untuk deteksi dan koreksi kesalahan, skema pengkodean lanjutan, skema pengodean linier dan siklik, metode decoding, penggunaan kode standar. • *Modulo-2 algebra, basic methods for error detection and correction, advanced coding schemes, linear and cyclic coding schemes, decoding*	**Tugas 6 / *Assignment 6*: 5%** **Tugas 7 / *Assignment 7*: 10%**

		error detection and correction, as well as the principle of adding parity bits • *Able to explain data coding schemes for error prevention* • *Able to explain the working principle of CRC*	*(Written Assignments)* **Assignment 7:** Advanced data encoding scheme, CRC and decoding (coding exercise)	•		*methods, the usage of standard codes.*	
12-14	Mahasiswa mampu menjelaskan teknik enkripsi data dan mengimplementasikannya dalam program sederhana *Students are able to explain data encription techniques and implementing it in a simple program*	• Mampu menjelaskan konsep keamanan data • Mampu menjelaskan teknik cryptography simetri dan publik • Mampu menjelaskan konsep hash function	**Non tes:** **Tugas 8:** Tugas menjelaskan konsep dan teknik cryptography (Tugas Tertulis) **Proyek**: Membuat program untuk enkripsi dan dekripsi data (Tugas Program) ***Non-test:*** ***Assignment 8:***	• Kuliah dan diskusi. [TM : 3 x 3 x 50"] [BM : 3 x 3 x 50"] [PT : 3 x 3 x 50"] • *Lecturers and Discussions.* *[FF : 3 x 3 x 50"]* *[SA : 3 x 3 x 50"]* *[SS : 3 x 3 x 50"]*		• Konsep dan skema kriptografi, termasuk kriptografi kunci rahasia, sandi aliran dan enkripsi blok, algoritme hash, dan algoritme kunci publik • *Concept and schemes of cryptography, including secret key cryptography, stream cipher and block encryption, hash algorithm,*	**Tugas 8 / *Assignment 8*: 5%** **Proyek / *Project*: 20%**

		• Mampu membuat program enkripsi dan dekripsi data • *Able to explain concept of data security* • *Able to explain symetric and public key cryptography techniques* • *Able to explain hash function* • *Able to develop encryption and decryption algorithm in program*	*Explaining about cryptography concept and techniques. (Written Assignments)* ***Project:*** *Defining the theme of the presentation is given in week 9. The presentation is carried out on week 14 – 15. (Presentation Assignment)*			*and public key algorithm*	
15-16	**EVALUASI AKHIR SEMESTER** ***FINAL-SEMESTER EXAM***						**20**

TM=Tatap Muka, **PT**=Penugasan Terstuktur, **BM**=Belajar Mandiri.
***FF** = Face to Face, **SA** = Structured Assignment, **SS** = Self Study.*

II. Rencana Asesmen & Evaluasi (RAE) / *Assessment & Evaluation Plan*

	ASSESSMENT & EVALUATION PLAN BACHELOR DEGREE PROGRAM OF BIOMEDICAL ENGINEERING - FTEIC ITS **Course : Medical Information Management**		**RA&E** Write Doc Code
Kode/*code*: **EB234910**	**Bobot sks/*credits* (T/P): 3/0**	**Rumpun MK: Teknik Biomedik** ***Course Cluster: Biomedical Engineering***	Smt: Peminatan *Specialization*
OTORISASI ***AUTHORIZATION***	**Penyusun RA & E** ***Compiler A&EP*** **Nada Fitrieyatul H, S.T, M.T**	**Koordinator RMK** ***Course Cluster Coordinator*** **Dr. Norma Hermawan, S.T., M.Sc.**	**Ka DEP** ***Head of DEP*** **Dr. Achmad Arifin, S.T., M.Eng.**

Mg ke/ *Week* (1)	**Sub CP-MK / *Lesson Learning Outcomes (LLO)* (2)**	**Bentuk Asesmen (Penilaian) *Form of Assessment* (3)**	**Bobot / *Load* (%) (4)**
1 - 2	**Sub CP-MK 1:** Mahasiswa memahami dan mampu menjelaskan tentang konsep dasar manajemen informasi medika. ***LLO 1:*** *Students understand and able to explain the basic concepts of medical information management.*	**Non-tes :** **Tugas 1:** Tugas mengenai konsep dasar MHIS. (Tugas Tertulis) **Tugas 2:** Mengenai aplikasi aplikasi GIS dalam HMIS. (Tugas Tertulis) **Tes:** ETS Soal 1 dan 2 (8% dari ETS 20%) ***Non-test :*** ***Assignment 1:*** *About the basic concepts of MHIS.* *(Written Assignments)* ***Assignment 2:*** *About the GIS application in HMIS.* *(Written Assignments)* ***Test:*** *Question 1 and 2 in Mid Exam (8% of Mid Exam 20%)*	Tugas 1 / *Assignment 1*: 5% Tugas 2 / *Assignment 2*: 5%
3	**Sub CP-MK 2:** Mahasiswa memahami dan mampu menjelaskan	**Non-tes :** **Tugas 3:** Klasifikasi dan representasi data medis (Tugas Tertulis).	Tugas 3 / *Assignment 3*: 5%

Mg ke/ *Week* (1)	Sub CP-MK / *Lesson Learning Outcomes (LLO)* (2)	Bentuk Asesmen (Penilaian) *Form of Assessment* (3)	Bobot / *Load* (%) (4)
	tentang klasifikasi dan representasi data medis. ***LLO 2:*** *Students understand and able to explain the classification and representation of medical data.*	**Tugas 4**: Tugas perancangan aplikasi rekam medis (Tugas Tertulis) **Tes:** ETS Soal 3, 4, dan 5 (12% dari ETS 30%) EAS Soal 1 (12% dari ETS 30%) ***Non-test :*** ***Assignment 3:*** *Medical data classification and representation.* *(Written Assignments)* ***Assignment 4:*** *Designing a medical record application.* *(Written Assignments)* ***Test:*** *Question 3, 4 and 5 in Mid Exam (12% of Mid Exam 20%)* *Question 1 in Final Exam (4% of Mid Exam 20%)*	Tugas 4 / *Assignment 4*: 15%
4	**Sub CP-MK 3:** Mahasiswa memahami dan mampu menjelaskan tentang konsep dasar sistem penomoran dan penyimpanan data medis serta penerapannya. ***LLO 3:*** *Students understand and able to explain the basic concepts of numbering systems and medical data storage and its application.*	**Non-tes :** **Tugas 5:** konsep dasar sistem penomoran dan penyimpanan data medis serta penerapannya (Tugas Tertulis) **Tugas 6:** Tugas mengenai standar koding, klasifikasi dan terminologi medis pada rekam medis (Tugas Tertulis) **Tes:** EAS Soal 2 dan 3 (8% dari EAS 20%) ***Non-test :*** ***Assignment 5:*** *Basic concepts of medical data storage and numbering system and its application.* *(Written Assignments)* ***Assignment 6:*** *About coding standards, classification and medical terminology on medical records.* *(Written Assignments)*	Tugas 5 / *Assignment 5*: 5% Tugas 6 / *Assignment 6*: 5%

Mg ke/ *Week* (1)	Sub CP-MK / *Lesson Learning Outcomes (LLO)* (2)	Bentuk Asesmen (Penilaian) *Form of Assessment* (3)	Bobot / *Load* (%) (4)
		Test: *Question 2 and 3 in Final Exam (8% of Final Exam 20%)*	
5	**Sub CP-MK 4:** Mahasiswa mengetahui, memahami dan mampu menjelaskan tentang aspek hukum dan perkembangan terkini dari manajemen informasi medika. ***LLO 4:*** *Students know, understand and able to explain legal aspects and the latest development of medical information management.*	**Non tes:** **Tugas 7:** Tugas mengenai aspek hukum dan perkembangan terkini dari HMIS (Tugas Tertulis) **Presentasi:** Penentuan tema presentasi diberikan pada minggu ke – 9. Proses presentasi dilakukan pada minggu ke – 14-15 (Tugas Presentasi) **Tes:** EAS Soal 4 dan 5 (8% dari EAS 20%) ***Non-test:*** ***Assignment 7:*** *About legal aspects and the latest developments of HMIS.* *(Written Assignments)* ***Presentation:*** *Defining the theme of the presentation is given in week 9. The presentation is carried out on week 14 – 15.* *(Presentation Assignment)* ***Test:*** *Question 4 and 5 in Final Exam (8% of Final Exam 20%)*	Tugas 7 / *Assignment 7*: 5% Presentasi / Presentation: 15%
6	**Sub CP-MK 5:** Mahasiswa memahami dan mampu menjelaskan konsep jaringan dan komunikasi data biomedika ***LLO 5:*** *Student understand and able to explain concept of biomedical data and network*	**Non-tes :** Tugas 5: Tugas mengenai konsep jaringan dan komunikasi data biomedika, serta protokol HL7 dan DICOM (Tugas Tertulis) ***Non-test :*** ***Assignment 5:*** *Basic concepts of biomedical data communication network and the HL7 and DICOM protocol.* *(Written Assignments)*	Tugas 5 / *Assignment 5*: 5%

Mg ke/ *Week* (1)	Sub CP-MK / *Lesson Learning Outcomes (LLO)* (2)	Bentuk Asesmen (Penilaian) *Form of Assessment* (3)	Bobot / *Load* (%) (4)
7	**Sub CP-MK 6:** Students must be able to develop network communication program. **LLO 6:** Students must be able to develop network communication program.	**Non tes:** **Mini Project*:*** *Penentuan tema mini project diberikan pada minggu ke – 9. Proses presentasi dilakukan pada minggu ke – 14- 15 (Demo program)* ***Non-test:*** ***Mini Project:*** *Defining the theme of the presentation is* given in week 9. The presentation is carried out on week 14 – 15. (Coding exercise)	**Proyek Mini / *Mini project: 20%***
8	**Evaluasi Tengah Semester** ***Mid Exam***	**Tes:** Ujian Tulis/Ujian Daring ***Test:*** *Writing Exams / Online Exams*	20%
9-11	**Sub CP-MK 7:** Mahasiswa mampu menjelaskan berbagai teknik koding data untuk deteksi dan koreksi error serta mengimplementasikannya dalam program sederhana **LLO 7:** *Student able to explain different types of data coding for error detection and correction as well as implementing it in a program*	Non-tes : Tugas 6: *Konsep dasar deteksi dan koreksi error dan penambahan bit parity (Tugas Tertulis)* Tugas 7: *Skema pengkodean data lanjutan, CRC dan dekoding (Tugas Program)* ***Non-test :*** ***Assignment 6:*** *Basic concepts of medical data storage and numbering system and its application.*	
12–14	**Sub CP-MK 8:** Mahasiswa mampu menjelaskan teknik enkripsi data dan mengimplementasikannya dalam program sederhana **LLO 8:** *Students are able to explain data encription*	**Non tes:** **Tugas 8:** *Tugas menjelaskan konsep dan teknik cryptography (Tugas Tertulis)* **Proyek*:*** *Membuat program untuk enkripsi dan dekripsi data (Tugas Program)* ***Non-test:*** ***Assignment 8:***	Tugas 8 / Assignment 5: 5% Proyek Mini / Mini project: 20%

Mg ke/ *Week* (1)	Sub CP-MK / *Lesson Learning Outcomes (LLO)* (2)	Bentuk Asesmen (Penilaian) *Form of Assessment* (3)	Bobot / *Load* (%) (4)
	techniques and implementing it in a simple program	*Explaining about cryptography concept and techniques. (Written Assignments)* ***Project:*** *Defining the theme of the presentation is given in week 9. The presentation is carried out on week 14 – 15. (Presentation Assignment)*	
15-16	**Evaluasi Akhir** ***Final Exam***	**Tes:** Ujian Tulis/Ujian Daring ***Test:*** *Writing Exams / Online Exams*	20%
		Total bobot penilaian ***Total assessment load***	**100%**

Indikator Pencapaian CPL Pada MK / *Indicator of PLO achievement charged to the course*

CPL yang dibebankan pada MK / *PLO charged to the course*	CPMK / *Course Learning Outcome (CLO)*	Minggu ke / *Week*	Bentuk Asesmen / *Form of Assessment*	Bobot / *Load* (%)
CPL-02 / *PLO-02*	CPMK 1 / *CLO 1*	*Week- 1-4*	*Assignment 1 and Assignment 2*	10
	CPMK 2 / *CLO 2*	*Week- 8*	*Mid Exam Question 1 and 2*	8
	CPMK 3 / *CLO 3*	*Week- 5-7*	*Assignment 3 and Assignment 4*	20
	CPMK 4 / *CLO 4*	*Week- 8*	*Mid Exam Question 3, 4 and 5*	12
		Week- 16	*Final Exam Question 1*	4
CPL-06 / *PLO-06*	CPMK 5 / *CLO 5*	*Week- 9-12*	*Assignment 5 and Assignment 6*	10
		Week- 16	*Final Exam Question 2 and 3*	8
CPL-09 / *PLO-09*	CPMK 6 / *CLO 6*	*Week- 13-15*	*Assignment 7 and Presentation*	20
		Week- 16	*Final Exam Question 4 and 5*	8
				∑ = 100%

No	*Form of Assessment*	*PLO-01*	*PLO-02*	*PLO-03*	*PLO-04*	*PLO-05*	*PLO-06*	*PLO-07*	*PLO-08*	*PLO-09*	*PLO-10*	*PLO-11*	*PLO-12*	*Total*
1	*Assignment 1*		0.05											**0.05**
2	*Assignment 2*		0.05											**0.05**
3	*Assignment 3*		0.05											**0.05**

No	*Form of Assessment*	*PLO-01*	*PLO-02*	*PLO-03*	*PLO-04*	*PLO-05*	*PLO-06*	*PLO-07*	*PLO-08*	*PLO-09*	*PLO-10*	*PLO-11*	*PLO-12*	*Total*
4	*Assignment 4*		0.15											**0.15**
5	*Assignment 5*						0.05							**0.05**
6	*Assignment 6*						0.05							**0.05**
7	*Assignment 7*									0.05				**0.05**
8	*Presentation*									0.15				**0.15**
9	*Mid Exam*		0.2											**0.2**
10	*Final Exam*		0.04				0.08			0.08				**0.2**
	Total		0.54				0.18			0.28				**1**