



# MODULE HANDBOOK TELEMEDICINE SYSTEM



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

**INSTITUT TEKNOLOGI SEPULUH NOPEMBER**

## ENDORSEMENT PAGE



**MODULE HANDBOOK**  
**Telemedicine Systems**  
**DEPARTMENT OF BIOMEDICAL ENGINEERING**  
 INSTITUT TEKNOLOGI SEPULUH NOPEMBER  
 Number : 6889/IT2.IX.5.1.2/B/PP.03.00.00/2023

| <b>Proses<br/>Process</b>                               | <b>Penanggung Jawab<br/>Person in Charge</b> |  |  | <b>Tanggal<br/>Date</b>  |
|---|--|--|--|--------------------------|
|   | <b>Nama<br/>Name</b>                         | <b>Jabatan<br/>Position</b>                          | <b>Tandatangan<br/>Signature</b>   |                          |
| Perumus<br><i>Preparation</i>                           | Dr. Rachmad Setiawan, S.T., M.T.             | Dosen<br><i>Lecturer</i>                             |  | <b>November 18, 2022</b> |
| Pemeriksa dan Pengendalian<br><i>Review and Control</i> | Prof. Dr. Ir. Mohammad Nuh, DEA.             | Tim kurikulum<br><i>Curriculum team</i>              | <b>TTD</b>   | <b>November 20, 2022</b> |
| Persetujuan<br><i>Approval</i>                          | Dr. Rachmad Setiawan, S.T., M.T.             | Koordinator RMK<br><i>Course Cluster Coordinator</i> |  | <b>April 13, 2023</b>    |
| Penetapan<br><i>Determination</i>                       | Dr. Achmad Arifin, S.T., M.Eng.              | Kepala Departemen<br><i>Head of Department</i>       |  | <b>April 17, 2023</b>    |


# MODULE HANDBOOK

## TELEMEDICINE SYSTEM

|   |  |  |
|---|--|--|
| Module name   | <b>Telemedicine System</b>   |  |
| Module level  | Undergraduate  |  |
| Code  | EB234902   |  |
| Course (if applicable)                                | Telemedicine System  |  |
| Semester  | Specialization   |  |
| Person responsible for the module                     |  |  |
| Lecturer  |  |  |
| Language  | Bahasa Indonesia and English   |  |
| Relation to curriculum                                | Undergraduate degree program, <b>specialization</b> .  |  |
| Type of teaching, contact hours                       | Lectures, <60 students   |  |
| Workload  | <ol style="list-style-type: none"> <li>1. Lectures : 3 x 50 = 150 minutes per week.</li> <li>2. Exercises and Assignments : 3 x 50 = 150 minutes per week.</li> <li>3. Private learning : 3 x 50 = 150 minutes per week.</li> </ol>  |  |
| 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        | <p>Course Learning Outcome (CLO) after completing this module,</p> <p>CLO 1: Students understand and are able to explain the history and importance of studying telemedicine , medical information concepts and data exchange at various levels of health facilities.</p> <p>CLO 2: Students understand and are able to explain patient medical data collection techniques and electronic devices and protocols used.</p> <p>CLO 3: Students understand and are able to explain technical concepts regarding sending medical information electronically via the internet and wireless systems.</p> <p>CLO 4: Students undertand and are able to explain the reliability and safety of the system seen from various</p> |  |

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|   | aspects of law, ethics and the latest developments related to telemedicine technology.   |  |
| Content   | This course of the Telemedicine System aims to provide an understanding of the principles, analysis, distribution and production applications in the field of electronic medicine and remote diagnostics. It also provides an overview of practical and outpatient telemedicine systems in the care of patients with chronic and persistent diseases, and shows new trends in health care techniques.  |  |
| Study and examination requirements and forms of examination | <ul style="list-style-type: none"> <li>● In-class exercises</li> <li>● Assignment 1, 2, 3</li> <li>● Presentation</li> <li>● Mid-term examination</li> <li>● Final examination</li> </ul>  |  |
| Media employed  | LCD, whiteboard, websites (myITS Classroom), zoom.   |  |
| Reading list  | <p>Main :</p> <ol style="list-style-type: none"> <li>1. J. D. Bronzino, "The Biomedical Engineering Handbook, Second Edition, Volume I", IEEE Press, Boca Raton, 2000</li> <li>2. J. D. Bronzino, "The Biomedical Engineering Handbook, Second Edition, Volume II", IEEE Press, Boca Raton, 2000</li> <li>3. Maheu Marlene, M., "E-Health, Telehealth, and Telemedicine", Josey-Bass A Willey Company San Francisco, 2001</li> <li>4. Norris, A., C., "Essential of Telemedicine and Telecare", John Wiley &amp; Sons, Ltd, Baffins Lane, England, 2002</li> <li>5. Bernard Fong, A.C.M. Fong, C.K. Li, "Telemedicine Technologies: Information Technologies In Medicine And Telehealth", John Wiley &amp; Sons Ltd, Chichester, 2011</li> </ol> |  |

**I. Rencana Pembelajaran Semester / Semester Learning Plan**

|  |  | <b>INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)</b><br><b>FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS TECHNOLOGY</b><br><b>DEPARTMENT OF BIOMEDICAL ENGINEERING</b>   |   |     |   | <b>Document Code</b>                             |
|---|--|--|---|-----|---|--|
| <b>SEMESTER LEARNING PLAN</b>   |  |  |   |     |   |  |
| <b>MATA KULIAH (MK)</b><br><b>COURSE</b>  | <b>KODE</b><br><b>CODE</b>   | <b>Rumpun MK</b><br><b>Course Cluster</b>  | <b>BOBOT (sks)</b><br><b>Credits</b>                        |     | <b>SEMESTER</b>                                   | <b>Tgl Penyusunan</b><br><b>Compilation Date</b> |
| <b>Sistem Telemedicine</b><br><i>Telemedicine System</i>                          | EB234902   | Teknik Biomedik<br><i>Biomedical Engineering</i>   | T=3   | P=0 | III   | Nov 9, 2022                                      |
| <b>OTORISASI / PENGESAHAN</b><br><b>AUTHORIZATION / ENDORSEMENT</b>               | <b>Dosen Pengembang RPS</b><br><i>Developer Lecturer of Semester Learning Plan</i>   |  | <b>Koordinator RMK</b><br><i>Course Cluster Coordinator</i> |     | <b>Ka DEPARTEMEN</b><br><i>Head of Department</i> |  |
|   | (Nada Fitriyatul Hikmah, S.T, M.T)   |  | (Dr. Norma Hermawan, S.T., M.Sc.)                           |     | (Dr. Achmad Arifin, S.T., M.Eng.)                 |  |
| <b>Capaian Pembelajaran</b>   | <b>CPL-PRODI yang dibebankan pada MK</b><br><b>PLO Program Charged to The Course</b> |  |   |     |   |  |
| <b>Learning Outcomes</b>  | <b>CPL 2</b><br><b>PLO 2</b>   | Mampu <b>menemukan, memahami, menjelaskan, merumuskan</b> , dan <b>menyelesaikan</b> 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<br><i>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</i> |   |     |   |  |
|   | <b>CPL 5</b><br><b>PLO 5</b>   | Mampu <b>mendesain</b> komponen, sistem, dan proses dalam bidang Teknik Biomedika yang sistematis, logis, dan realistis sesuai dengan spesifikasi yang ditentukan dengan mempertimbangkan aspek keselamatan, sosial, budaya, lingkungan, dan ekonomi dengan <b>mengenal/memanfaatkan</b> sumber daya lokal dan nasional dengan wawasan global  |   |     |   |  |

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|  |  | <i>Able to design components, systems, and processes in the field of Biomedical Engineering that are systematic, logical, and realistic appropriate with specified specifications by considering aspects of safety, social, cultural, environmental, and economic by recognizing / utilizing local and national resources with global insight</i>   |
| <b>CPL 6</b><br><b>PLO 6</b>   |  | Mampu <b>menerapkan</b> ilmu pengetahuan, keterampilan, dan metode terkini dalam menyelesaikan permasalahan di bidang Teknik Biomedika<br><i>Able to apply the latest knowledge, skills and methods in solving problems in the field of Biomedical Engineering</i>  |
| <b>CPL 9</b><br><b>PLO 9</b>   |  | Mampu <b>mengetahui/mengikuti</b> perkembangan terkini dibidang ilmu pengetahuan dan teknologi serta <b>menyikapinya secara obyektif</b> dengan mengedepankan nilai-nilai kebenaran universal<br><i>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</i>                            |
| <b>Capaian Pembelajaran Mata Kuliah (CPMK)</b><br><b>Course Learning Outcome (CLO) - If CLO as description capability of each Learning Stage in the course, then CLO = LLO</b> |  |   |
| <b>CP MK 1</b><br><b>CLO 1</b>   |  | Mahasiswa memahami dan mampu menjelaskan sejarah dan pentingnya mempelajari telemedicine, konsep informasi medis, dan pertukaran data pada berbagai tingkat fasilitas kesehatan.<br><i>Students understand and are able to explain the history and importance of studying telemedicine , medical information concepts, and data exchange at various levels of health facilities.</i>        |
| <b>CP MK 2</b><br><b>CLO 2</b>   |  | Mahasiswa memahami dan mampu menjelaskan teknik pengambilan data medis pasien dan perangkat elektronik serta protokol yang digunakan.<br><i>Students understand and are able to explain patient medical data collection techniques and electronic devices and protocols used.</i>   |
| <b>CP MK 3</b><br><b>CLO 3</b>   |  | Mahasiswa memahami dan mampu menjelaskan konsep teknis mengenai pengiriman informasi medis secara elektronik melalui media internet dan sistem nirkabel.<br><i>Students understand and are able to explain technical concepts regarding sending medical information electronically via the internet and wireless systems.</i>   |
| <b>CP MK 4</b><br><b>CLO 4</b>   |  | Mahasiswa memahami dan mampu menjelaskan tentang keandalan dan keamanan sistem yang dilihat dari berbagai aspek hukum, etika dan perkembangan terkini terkait teknologi telemedicine<br><i>Students undertand and are able to explain the reliability and safety of the system seen from various aspects of law, ethics and the latest developments related to telemedicine technology.</i> |

| Peta CPL – CP MK<br><br>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<br>CLO 1 / LLO 1  |        | √      |        |        |        |        |        |        |        |        |        |  |
|   | CPMK 2 / SUB CPMK 2<br>CLO 2 / LLO 2  |        |        |        |        | √      |        |        |        |        |        |        |  |
|   | CPMK 3 / SUB CPMK 3<br>CLO 3 / LLO 3  |        |        |        |        |        | √      |        |        |        |        |        |  |
|   | CPMK 4 / SUB CPMK 4<br>CLO 4 / LLO 4  |        |        |        |        |        |        |        | √      |        |        |        |  |
| <b>Diskripsi Singkat MK</b><br><br><i>Short Description of Course</i>       | <p>Mata kuliah Sistem Telemedicine ini bertujuan untuk memberikan pemahaman tentang prinsip-prinsip, analisis, distribusi dan aplikasi produksi pada bidang elektronika medika dan diagnostik jarak jauh. Selain itu juga memberikan gambaran mengenai sistem telemedicine praktis dan rawat jalan pada perawatan pasien penderita penyakit kronis dan persisten, serta menunjukkan tren baru dalam teknik perawatan kesehatan.</p> <p><i>This course of the Telemedicine System aims to provide an understanding of the principles, analysis, distribution and production applications in the field of electronic medicine and remote diagnostics. It also provides an overview of practical and outpatient telemedicine systems in the care of patients with chronic and persistent diseases, and shows new trends in health care techniques.</i></p> |        |        |        |        |        |        |        |        |        |        |        |  |
| <b>Bahan Kajian:</b><br>Materi pembelajaran<br><br><i>Course Materials:</i> | <ol style="list-style-type: none"> <li>1. Sejarah dan ruang lingkup telemedicine / <i>History and scope of telemedicine</i></li> <li>2. Pengiriman data nirkabel / <i>Wireless data transmission</i></li> <li>3. Keandalan sitem informasi / <i>Information sytem reliability</i></li> <li>4. Regulasi, hukum, dan etika telemedicine / <i>Regulation,law, and ethic of telemedicine</i></li> </ol>   |        |        |        |        |        |        |        |        |        |        |        |  |
| <b>Pustaka</b>  | <b>Utama / Main:</b>  |        |        |        |        |        |        |        |        |        |        |        |  |

| <b>References</b>                         |   | <ol style="list-style-type: none"> <li>1. J. D. Bronzino, "The Biomedical Engineering Handbook, Second Edition, Volume I", IEEE Press, Boca Raton, 2000</li> <li>2. J. D. Bronzino, "The Biomedical Engineering Handbook, Second Edition, Volume II", IEEE Press, Boca Raton, 2000</li> <li>3. Maheu Marlene, M., "E-Health, Telehealth, and Telemedicine", Josey-Bass A Willey Company San Francisco, 2001</li> <li>4. Norris, A., C., "Essential of Telemedicine and Telecare", John Wiley &amp; Sons, Ltd, Baffins Lane, England, 2002</li> <li>5. Bernard Fong, A.C.M. Fong, C.K. Li, "Telemedicine Technologies: Information Technologies In Medicine And Telehealth", John Wiley &amp; Sons Ltd, Chichester, 2011</li> </ol> |  |   |  |   |                                      |
|---|---|--|--|---|--|---|--------------------------------------|
| <b>Dosen Pengampu<br/>Lecturers</b>       |   |  |  |   |  |   |                                      |
| <b>Matakuliah syarat<br/>Prerequisite</b> |   | -  |  |   |  |   |                                      |
| Mg ke/<br>Week                            | Kemampuan akhir tiap tahapan belajar (Sub-CPMK)<br>/<br>Final ability of each learning stage (LLO)  | Penilaian / Assessment   |  | Bantuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa;<br>[Estimasi Waktu] /<br>Form of Learning; Learning Method;<br>Student Assignment;<br>[Estimated Time] |  | Materi Pembelajaran<br>[Pustaka] /<br>Learning Material<br>[Reference]  | Bobot Penilaian /Assessment Load (%) |
|   |   | Indikator / Indicator  | Kriteria & Teknik / Criteria & Techniques  | Tatap Muka / In-class (5)   | Daring / Online (6)  |   |                                      |
| (1)                                       | (2)   | (3)  | (4)  | (5)   | (6)  | (7)   | (8)                                  |
| 1,2,3,4                                   | Mahasiswa memahami dan mampu menjelaskan sejarah dan pentingnya mempelajari telemedicine, konsep informasi medis dan pertukaran data pada | <ul style="list-style-type: none"> <li>• Kebenaran pemahaman, jawaban dan analisa.</li> <li>• Keberhasilan menjelaskan tugas.</li> <li>• Ketepatan waktu pengumpulan tugas.</li> </ul>   | <b>Non-tes :</b><br><b>Tugas 1:</b><br>Tugas tentang sejarah teknologi telekomunikasi di bidang kesehatan. Fasilitas kesehatan | <ul style="list-style-type: none"> <li>• Kuliah dan diskusi.</li> <li>• Penugasan Terstruktur.</li> </ul> [TM : 4x (3 x 50'')]  | <ul style="list-style-type: none"> <li>• Chatting dan diskusi dalam forum platform ITS.</li> <li>• Chat and discussion in</li> </ul> | <ul style="list-style-type: none"> <li>• Sejarah teknologi telekomunikasi di bidang kesehatan, pengenalan telemedicine, teleradiology,</li> </ul> | 5                                    |



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|--|---|---|--|--|-----------------------------------|--|--|
|  | <p>berbagai tingkat fasilitas kesehatan.</p> <p><i>Students understand and are able to explain the history and importance of studying telemedicine, medical information concepts and data exchange at various levels of health facilities</i></p> | <ul style="list-style-type: none"> <li>● <i>Truth understanding, answers and analysis.</i></li> <li>● <i>Success of explaining assignments.</i></li> <li>● <i>On time submission of assignments.</i></li> </ul> | <p>dan Sistem Informasi Rumah sakit (HIS), sistem komunikasi pada bidang kesehatan dan komunikasi klinis pada telemedicine (Tugas Tertulis)</p> <p><b>Non-test :</b><br/> <b>Task 1:</b><br/> <i>Task about the history of telecommunication technology in the health sector. Health facilities and Hospital Information Systems (HIS), communication systems in the health sector and clinical communication on telemedicine ( Written Task )</i></p> | <p>[BM : 4x (3 x 50")]<br/> [PT :4x( 3 x 50")]</p> <ul style="list-style-type: none"> <li>● <i>Presentation and discussions</i></li> <li>● <i>Structured assignments.</i></li> </ul> <p>[FF : 2x (3 x 50")]<br/> [SA : 4x (3 x 50")]<br/> [SS :4x( 3 x 50")]</p> | <p><i>ITS platform forum.</i></p> | <p>telepathology, dan lain-lain.</p> <ul style="list-style-type: none"> <li>● Fasilitas kesehatan dan Sistem Informasi Rumah Sakit (HIS), konsep dasar HIS pada berbagai tingkat fasilitas kesehatan</li> <li>● Sistem komunikasi pada bidang kesehatan : transmisi dan pemrosesan data kesehatan dan informasi medis.</li> <li>● Komunikasi klinis pada telemedicine : manajemen teknis, hak akses</li> <li>● <a href="#">[Link materi di MyITSClassroom]</a></li> <li>● <i>History of telecommunication technology in the health sector, introduction to telemedicine, teleradiology, telepathology and others.</i></li> </ul> |  |
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|         |  |   |   |   |   |   |   |
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|         |  |   |   |   |   | <ul style="list-style-type: none"> <li>• <i>Health facilities and Hospital Information System (HIS), the basic concept of HIS at various levels of health facilities.</i></li> <li>• <i>Communication systems in the health sector : transmission and processing of health data and medical information.</i></li> <li>• <i>Clinical communication on telemedicine : technical management, access rights.</i></li> </ul> |   |
| 5,6,7,9 | <p>Mahasiswa memahami dan mampu menjelaskan teknik pengambilan data medis pasien dan perangkat elektronik serta protokol yang digunakan.</p> <p><i>Students understand and are able to explain patient medical data collection techniques and electronic devices and protocols used.</i></p> | <ul style="list-style-type: none"> <li>• Kebenaran pemahaman, jawaban dan analisa.</li> <li>• Keberhasilan menjelaskan tugas.</li> <li>• Ketepatan waktu pengumpulan tugas.</li> <li>• <i>Truth understanding, answers and analysis.</i></li> <li>• <i>Success of explaining assignments.</i></li> <li>• <i>On time submission of assignments.</i></li> </ul> | <p><b>Non-tes :</b><br/><b>Tugas 2:</b><br/>Tugas tentang protokol medis elektronik, scanning telematika dari data biologis, transfer sinyal biomedis pada telemedicine dan penggunaannya untuk perangkat</p> | <ul style="list-style-type: none"> <li>• Kuliah dan diskusi.</li> <li>• Penugasan Terstruktur. [TM : 3 x 50"] [BM : 3 x 50"] [PT : 3 x 50"]</li> <li>• <i>Presentation and discussions</i></li> <li>• <i>Structured assignments.</i></li> </ul> <p>[FF : 3 x 50"]</p> | <ul style="list-style-type: none"> <li>• Chatting dan diskusi dalam forum platform ITS.</li> <li>• <i>Chat and discussion in ITS platform forum.</i></li> </ul> | <ul style="list-style-type: none"> <li>• Scanning telematika dari data biologis</li> <li>• Protokol medis elektronik : kartu pasien, database informasi medis, komunikasi berbagai unsur tersebut dengan mempertimbangkan keamanan data dan etika</li> <li>• Transfer sinyal biomedis pada</li> </ul>   | 5 |

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|  |  |  | <p>stimulasi (Tugas Tertulis)</p> <p><b>Non-test :</b><br/> <b>Task 2:</b> <i>Task on electronic medical protocols, telematic scanning of biological data, transfer of biomedical signals to telemedicine and their use for stimulation devices (Written Task).</i></p> | <p>[SA : 3 x 50"]<br/> [SS : 3 x 50"]</p> |  | <p>telemedicine :<br/> transmitters, rantai transmisi, transmisi multi-channel</p> <ul style="list-style-type: none"> <li>● Transfer sinyal biomedis pada telemedicine dan penggunaannya untuk perangkat stimulasi : pacemakers dan neurostimulators</li> <li>● <i>Telematics scanning of biological data</i></li> <li>● <i>Electronic medical protocols : patient cards , medical information databases , communication of these elements taking into account data security and ethics</i></li> <li>● <i>Transfer signal biomedical on telemedicine: transmitters, chains transmission of multi-channel</i></li> <li>● <i>Transfer of biomedical signals</i></li> </ul> |  |
|--|--|--|---|---|--|--|--|


|                 |   |   |   |  |   |   |           |
|-----------------|---|---|---|--|---|---|-----------|
|                 |   |   |   |  |   | <i>in telemedicine and their use for stimulation devices; pacemakers and neurostimulators</i>   |           |
| <b>8</b>        | <b>EVALUASI TENGAH SEMESTER<br/>MID-SEMESTER EXAM</b>   |   |   |  |   |   | <b>30</b> |
| <b>10,11,12</b> | <p>Mahasiswa memahami dan mampu menjelaskan konsep teknis mengenai pengiriman informasi medis secara elektronik melalui media internet dan sistem nirkabel</p> <p><i>Students understand and are able to explain technical concepts regarding sending medical information electronically via the internet and wireless systems.</i></p> | <ul style="list-style-type: none"> <li>● Kebenaran pemahaman, jawaban dan analisa.</li> <li>● Keberhasilan menjelaskan tugas.</li> <li>● Ketepatan waktu pengumpulan tugas.</li> <li>● <i>Truth understanding, answers and analysis.</i></li> <li>● <i>Success of explaining assignments.</i></li> <li>● <i>On time submission of assignments.</i></li> </ul> | <p><b>Non-tes :</b><br/><b>Tugas 3:</b><br/>Tugas tentang internet dan kesehatan, paradigma ubiquitous computing dan aplikasi internet pada telemedicine, pengiriman data nirkabel (GSM) dan penggunaannya dalam terapi dan diagnostik telemedicine (Tugas Tertulis)</p> <p><b>Non-test :</b><br/><b>Task 3:</b><br/><i>Tasks about internet and health, ubiquitous computing</i></p> | <ul style="list-style-type: none"> <li>● Kuliah dan diskusi.</li> <li>● Penugasan Terstruktur. [TM : 3x(3 x 50" )]<br/>[BM : 3x (3 x 50" )]<br/>[PT : 3x ( 3 x 50" )]</li> <li>● <i>Presentation and discussions</i></li> <li>● <i>Structured assignments.</i></li> <li>● [FF : 3x (3 x 50" )]<br/>[SA : 3x ( 3 x 50" )]<br/>[SS : 3x (3 x 50" )]</li> </ul> | <ul style="list-style-type: none"> <li>● Chatting dan diskusi dalam forum platform ITS.</li> <li>● <i>Chat and discussion in ITS platform forum.</i></li> </ul> | <ul style="list-style-type: none"> <li>● Internet dan kesehatan : internet, www, protokol TCPIP, tipe koneksi</li> <li>● Paradigma ubiquitous computing dan aplikasi internet pada telemedicine :sejarah web dan sistem diagnostik web.</li> <li>● Pengiriman data nirkabel (GSM) dan penggunaannya dalam terapi dan diagnostik telemedicine</li> <li>● <i>Internet and health: internet , www, protocols TCPI P, connection type</i></li> <li>● <i>The paradigm of ubiquitous computing and</i></li> </ul> | <b>5</b>  |

|                  |  |  |   |  |   |   |                                  |
|------------------|--|--|---|--|---|---|----------------------------------|
|                  |  |  | <i>paradigm and internet applications on telemedicine, wireless data transmission (GSM) and their use in telemedicine therapy and diagnostics (Written Task)</i>  |  |   | <i>applications internet on telemedicine : the history of the web and diagnostics systems web</i><br><ul style="list-style-type: none"> <li>• <i>Wireless data transmission (GSM) and its use in telemedicine therapy and diagnostics</i></li> </ul>  |                                  |
| <b>13,14, 15</b> | <p>Mahasiswa memahami dan mampu menjelaskan tentang keandalan dan keamanan sistem yang dilihat dari berbagai aspek hukum, etika dan perkembangan terkini terkait teknologi telemedicine.</p> <p><i>Students understand and are able to explain the reliability and safety of the system seen from various aspects of law, ethics and the latest developments related to telemedicine technology.</i></p> | <ul style="list-style-type: none"> <li>• Kebenaran pemahaman, jawaban dan analisa.</li> <li>• Keberhasilan menjelaskan tugas.</li> <li>• Ketepatan waktu pengumpulan tugas.</li> <li>• Kebenaran isi presentasi.</li> <li>• Kelancaran dan keberhasilan menyampaikan materi</li> <li>• Laporan tertulis</li> <li>• <i>Truth understanding, answers and analysis.</i></li> <li>• <i>Success of explaining assignments.</i></li> </ul> | <p><b>Non tes:</b></p> <p><b>Tugas 4:</b><br/>Tugas tentang keandalan sistem informasi kesehatan, keamanan electric dari peralatan dan perangkat medis, serta permasalahan hukum dan etika pada teknologi telemedicine (Tugas Tertulis)</p> <p><b>Presentasi:</b><br/>Penentuan tema presentasi diberikan pada minggu ke – 8.<br/>Proses presentasi</p> | <ul style="list-style-type: none"> <li>• Kuliah dan diskusi.</li> <li>• Penugasan Terstruktur. [TM + BM: 2 x 2 x 50 menit]</li> <li>• <i>Presentation and discussions</i></li> <li>• <i>Structured assignments.</i></li> </ul> <p>[FF + SA: 2 x 2 x 50"]</p> | <ul style="list-style-type: none"> <li>• Chatting dan diskusi dalam forum platform ITS.</li> <li>• <i>Chat and discussion in ITS platform forum.</i></li> </ul> | <ul style="list-style-type: none"> <li>• Keandalan sistem informasi kesehatan (hardware, software), keamanan electric dari peralatan dan perangkat medis</li> <li>• Permasalahan hukum dan etika pada teknologi telemedicine.</li> <li>• Perkembangan terkini dari teknologi telemedicine</li> <li>• <i>Reliability of health information systems (hardware, software), electric safety of medical</i></li> </ul> | <p><b>5</b></p> <p><b>20</b></p> |

|       |  |  |   |  |  |   |    |
|-------|--|--|---|--|--|---|----|
|       |  | <ul style="list-style-type: none"> <li>• <i>On time submission of assignments.</i></li> <li>• <i>The correctness of the presentation content.</i></li> <li>• <i>Smoothness and success in delivering material.</i></li> <li>• <i>Written report</i></li> </ul> | <p>dilakukan pada minggu ke – 10 – 16 (Tugas Presentasi)</p> <p><b>Non-test:</b><br/><b>Task 4:</b><br/><i>Tasks regarding the reliability of health information systems, the electric safety of medical equipment and devices, as well as legal and ethical issues in telemedicine technology (Written Task)</i></p> <p><b>Presentation:</b><br/><i>Determination of the presentation theme is given in week 8. The presentation process is carried out on week 10 - 16 (Presentation Task )</i></p> |  |  | <p><i>equipment and devices</i></p> <ul style="list-style-type: none"> <li>• <i>Legal and ethical issues in telemedicine technology</i></li> <li>• <i>Recent developments of telemedicine technology</i></li> </ul> |    |
| 15-16 | <b>EVALUASI AKHIR SEMESTER<br/>FINAL-SEMESTER EXAM</b> |  |   |  |  |   | 30 |

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

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

|   |  |  |   |
|---|--|--|---|
|  | <b>ASSESSMENT &amp; EVALUATION PLAN</b><br><b>BACHELOR DEGREE PROGRAM OF BIOMEDICAL ENGINEERING - FTEIC ITS</b><br><b>Course : Telemedicine System</b> |  | <b>RA&amp;E</b>   |
|   |  |  | Write Doc Code  |
| <b>Kode/code:</b><br><b>EB234902</b>  | <b>Bobot sks/credits (T/P): 3/0</b>  | <b>Rumpun MK: Teknik Biomedik</b><br><b>Course Cluster: Biomedical Engineering</b> | <b>Smt:</b><br>Peminatan<br><i>Specialization</i>                       |
| <b>OTORISASI AUTHORIZATION</b>  | <b>Penyusun RA &amp; E Compiler A&amp;EP</b>   | <b>Koordinator RMK Course Cluster Coordinator</b>                                  | <b>Ka DEP Head of DEP</b><br><br><b>Dr. Achmad Arifin, S.T., M.Eng.</b> |

| Mg ke/Week (1) | Sub CP-MK / Lesson Learning Outcomes (LLO) (2)  | Bentuk Asesmen (Penilaian) Form of Assessment (3)  | Bobot / Load (%) (4) |
|----------------|---|--|----------------------|
| 1,2,3,4        | <p><b>Sub CP-MK 1:</b><br/>Mahasiswa memahami dan mampu menjelaskan sejarah dan pentingnya mempelajari telemedicine, konsep informasi medis dan pertukaran data pada berbagai tingkat fasilitas kesehatan.</p> <p><b>LLO 1:</b><br/><i>Students understand and are able to explain the history and importance of studying telemedicine, medical</i></p> | <p><b>Non-tes :</b><br/> <b>Tugas 1:</b><br/>Tugas tentang sejarah teknologi telekomunikasi di bidang kesehatan. Fasilitas kesehatan dan Sistem Informasi Rumah sakit (HIS), sistem komunikasi pada bidang kesehatan dan komunikasi klinis pada telemedicine (Tugas Tertulis)<br/> <b>Tes:</b><br/>ETS 2 Soal (12% dari ETS 30%)</p> <p><b>Non-test :</b><br/> <b>Task 1:</b><br/><i>Task about the history of telecommunication technology in the health sector. Health facilities and Hospital Information Systems (HIS), communication systems in the health sector and clinical communication on telemedicine ( Written Task ).</i><br/> <b>Test:</b><br/>2 Question in Mid Exam (12% of Mid Exam 30%)</p> | 5                    |



|          |  |  |    |
|----------|--|--|----|
|          | <i>information concepts and data exchange at various levels of health facilities</i>   |  |    |
| 5,6,7,9  | <p><b>Sub CP-MK 2:</b><br/>Mahasiswa memahami dan mampu menjelaskan teknik pengambilan data medis pasien dan perangkat elektronik serta protokol yang digunakan.</p> <p><b>LLO 2:</b><br/><i>Students understand and are able to explain patient medical data collection techniques and electronic devices and protocols used.</i></p> | <p><b>Non-tes :</b><br/><b>Tugas 2:</b><br/>Tugas tentang protokol medis elektronik, scanning telematika dari data biologis, transfer sinyal biomedis pada telemedicine dan penggunaannya untuk perangkat stimulasi (Tugas Tertulis)<br/><b>Tes:</b><br/>ETS 3 Soal (18% dari ETS 30%)<br/>EAS Soal 1 (6% dari ETS 30%)</p> <p><b>Non-test :</b><br/><b>Task 2:</b><br/><i>Task on electronic medical protocols, telematic scanning of biological data, transfer of biomedical signals to telemedicine and their use for stimulation devices (Written Task).</i></p> <p><b>Test:</b><br/><i>3 Question in Mid Exam (18% of Mid Exam 30%)<br/>Question 1 in Final Exam (6% of Mid Exam 30%)</i></p> | 5  |
| 8        | <p><b>Evaluasi Tengah Semester</b></p> <p><b>Mid Exam</b></p>  | <p><b>Tes:</b><br/>Ujian Tulis/Ujian Daring</p> <p><b>Test:</b><br/><i>Writing Exams / Online Exams</i></p>  | 30 |
| 10,11,12 | <p><b>Sub CP-MK 3:</b><br/>Mahasiswa memahami dan mampu menjelaskan konsep teknis mengenai pengiriman informasi medis secara elektronik melalui media</p>  | <p><b>Non-tes :</b><br/><b>Tugas 3:</b><br/>Tugas tentang internet dan kesehatan, paradigma ubiquitous computing dan aplikasi internet pada telemedicine, pengiriman data nirkabel (GSM) dan penggunaannya dalam terapi dan diagnostik telemedicine (Tugas Tertulis)<br/><b>Tes:</b><br/>EAS 2 Soal (12% dari ETS 30%)</p> <p><b>Non-test :</b><br/><b>Task 3:</b></p>   | 5  |

|          |  |  |             |
|----------|--|--|-------------|
|          | <p>internet dan sistem nirkabel</p> <p><b>LLO 3:</b><br/><i>Students understand and are able to explain technical concepts regarding sending medical information electronically via the internet and wireless systems</i></p>  | <p><i>Tasks about internet and health, ubiquitous computing paradigm and internet applications on telemedicine, wireless data transmission (GSM) and their use in telemedicine therapy and diagnostics (Written Task)</i></p> <p><b>Test:</b><br/>2 Question in Final Exam (12% of Mid Exam 30%)</p>   |             |
| 13,14,15 | <p><b>Sub CP-MK 4:</b> Mahasiswa memahami dan mampu menjelaskan tentang keandalan dan keamanan sistem yang dilihat dari berbagai aspek hukum, etika dan perkembangan terkini terkait teknologi telemedicine.</p> <p><b>LLO 4:</b><br/><i>Students understand and are able to explain the reliability and safety of the system seen from various aspects of law, ethics and the latest developments related to telemedicine technology.</i></p> | <p><b>Non-tes :</b><br/><b>Tugas 4:</b><br/>Tugas tentang keandalan sistem informasi kesehatan, keamanan electric dari peralatan dan perangkat medis, serta permasalahan hukum dan etika pada teknologi telemedicine (Tugas Tertulis)</p> <p><b>Presentasi:</b><br/>Penentuan tema presentasi diberikan pada minggu ke – 8. Proses presentasi dilakukan pada minggu ke – 10 – 16 (Tugas Presentasi)</p> <p><b>Tes:</b><br/>EAS 2 Soal (12% dari ETS 30%)</p> <p><b>Non-test:</b><br/><b>Task 4:</b><br/><i>Tasks regarding the reliability of health information systems, the electric safety of medical equipment and devices, as well as legal and ethical issues in telemedicine technology (Written Task)</i></p> <p><b>Presentation:</b><br/><i>Determination of the presentation theme is given in week 8. The presentation process is carried out on week 10 - 16 (Presentation Task )</i></p> <p><b>Test:</b><br/>2 Question in Final Exam (12% of Mid Exam 30%)</p> | 5<br><br>20 |
| 16       | <p><b>Evaluasi Akhir</b></p> <p><b>Final Exam</b></p>  | <p><b>Tes:</b><br/>Ujian Tulis/Ujian Daring</p> <p><b>Test:</b></p>  | 30          |

|  |  |                                     |  |
|--|--|-------------------------------------|--|
|  |  | <i>Writing Exams / Online Exams</i> |  |
|  |  |                                     | <b>Total bobot penilaian<br/>Total assessment load</b> |
|  |  |                                     | <b>100%</b>  |

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

| CPL yang dibebankan pada MK / <i>PLO charged to the course</i> | CPMK / <i>Course Learning Outcome (CLO)</i> | Minggu ke / <i>Week</i> | Bentuk Asesmen / <i>Form of Assessment</i> | Bobot / <i>Load (%)</i> |
|--|---|-------------------------|--|-------------------------|
| CPL 2 / <i>PLO 2</i>   | CPMK 1 / <i>CLO 1</i>                       | Week- 1-4               | Task 1                                     | 5                       |
|  |   | Week- 8                 | Mid Exam Question 1 and 2                  | 12                      |
| CPL 5 / <i>PLO 5</i>   | CPMK 2 / <i>CLO 2</i>                       | Week- 5-7, 9            | Task 2                                     | 5                       |
|  |   | Week- 8                 | Mid Exam Question 3,4,5                    | 18                      |
|  |   | Week- 16                | Final Exam Question 1                      | 6                       |
| CPL 6 / <i>PLO 6</i>   | CPMK 3 / <i>CLO 3</i>                       | Week- 10-12             | Task 3                                     | 5                       |
|  |   | Week- 16                | Final Exam Question 2,3                    | 12                      |
| CPL 9 / <i>PLO 9</i>   | CPMK 4 / <i>CLO 4</i>                       | Week- 13-15             | Task 4                                     | 5                       |
|  |   | Week- 13-15             | Presentation                               | 20                      |
|  |   | Week- 16                | Final Exam Question 4,5                    | 12                      |
|  |   |                         |  | <b>Σ = 100%</b>         |

| 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  | Task 1             |        | 0.05   |        |        |        |        |        |        |        |        |        |        | 0.05  |
| 2  | Task 2             |        |        |        |        | 0.05   |        |        |        |        |        |        |        | 0.05  |
| 3  | Task 3             |        |        |        |        |        | 0.05   |        |        |        |        |        |        | 0.05  |
| 4  | Task 4             |        |        |        |        |        |        |        |        | 0.05   |        |        |        | 0.05  |
| 5  | Presentation       |        |        |        |        |        |        |        |        | 0.2    |        |        |        | 0.2   |
| 4  | Mid Exam           |        | 0.12   |        |        | 0.18   |        |        |        |        |        |        |        | 0.3   |
| 5  | Final Exam         |        |        |        |        | 0.06   | 0.12   |        |        | 0.12   |        |        |        | 0.3   |
|    | Total              |        | 0.17   |        |        | 0.29   | 0.17   |        |        | 0.37   |        |        |        | 1     |

