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|  | **UNIVERSITAS SUMATERA UTARA (USU)****FAKULTAS TEKNIK****DEPARTEMEN TEKNIK ELEKTRO** | **Kode Dokumen** |
| **RENCANA PEMBELAJARAN SEMESTER** |
| **MATA KULIAH (MK)** | **KODE** | **Rumpun MK** | **BOBOT (sks)** | **SEMESTER** | **Tgl Penyusunan** |
| Radar dan Navigasi | TEE4134 |  | **2** |  |  | 7 AGUSTUS 2022 |
| **OTORISASI / PENGESAHAN** | **Dosen Pengembang RPS** | **Koordinator RMK** | **Ka Prodi** |
| Ir. sihar Panjaitan, MT |  | Suherman, ST., M.Comp., Ph.D |
| **Capaian Pembelajaran** | **CPL-PRODI yang dibebankan pada MK**  |  |
| CPL-1 | Mampu menerapkan pengetahuan matematika, ilmu pengetahuan alam/atau material, teknologi informasi dan kerekayasaan untuk mendapatkan pemahaman menyeluruh tentang prinsip-prinsip Teknik Elektro. |
| CPL-2 | Mampu mendesain komponen, sistem dan/atau proses untuk memenuhi kebutuhan yang diharapkan oleh masyarakat dengan dihadapkan pada batasan realistik yang meliputi aspek hukum, ekonomi, lingkungan, sosial, politik, kesehatan dan keselamatan, keberlanjutan. |
| CPL-3 | Mampu mendesain eksperimen laboratorium dan/atau lapangan serta menganalisis dan mengartikan data untuk memperkuat penilaian teknik khususnya dalam bidang Teknik Elektro. |
| CPL-4 | Mampu menyelesaikan permasalahan teknik khususnya dalam bidang Teknik Elektro secara bertanggungjawab dan memenuhi etika profesi. |
| CPL-5 | Mampu menerapkan metode, keterampilan dan perangkat teknik modern yang diperlukan untuk praktek profesi Teknik Elektro. |
| CPL-6 | Mampu berkomunikasi secara efektif, baik lisan maupun tulisan. |
| CPL-7 | Mampu mengevaluasi tugas-tugas dalam batasan yang ada secara disiplin dan menyeluruh. |
| CPL-8 | Mampu untuk bekerja dalam tim lintas disiplin dan multikultural serta global internasional. |
| CPL-9 | Mampu untuk bertanggung jawab kepada masyarakat dan mematuhi etika profesi dalam menyelesaikan permasalahan Teknik Elektro. |
| CPL-10 | Memiliki kapasitas pembelajaran sepanjang hayat termasuk akses pengetahuan yang relevan tentang isu-isu terkini. |
| CPL-11 | Mampu mengidentifikasi potensi daerah di Sumatera Utara dan menerapkan inovasi, metode, keterampilan, dan perangkat teknik elektro yang relevan untuk mengembangkan potensi daerah tersebut. |
| CPL-12 | Mampu mendesain sistem dan/atau proses untuk memanfaatkan energi baru dan terbarukan sebagai sumber energi listrik alternatif dari potensi sumber daya lokal dan nasional dengan wawasan global. |
| **Capaian Pembelajaran Mata Kuliah (CPMK)**  |  |
| CPMK 1 | Mengenal konsep dasar sinyal sistem telekomunikasi serta prinsip pengolahan sinyal telekomunikasi secara umum. |
| CPMK 2 | Memahami prinsip kerja jaringan telepon konvensional. |
| CPMK 3 | Memahami secara logis pengiriman informasi dalam sinyal komunikasi dan teknik yang dibutuhkan secara umum. |
| CPMK 4 | Menunjukkan bagaimana sinyal dari berbagai sumber dapat menggunakan medium yang sama dengan meminimalkan kerusakan sinyal. |
| **Peta CPL – CPMK** |

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|  | **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  |  |  |  |  |  |  |  |  |  |  |  |  |
| CPMK 2  |  | Mohon | diceklis | yang | sesuai |  |  |  |  |  |  |  |
| CPMK 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| CPMK 4 |  |  |  |  |  |  |  |  |  |  |  |  |

 |
| **Diskripsi Singkat MK** | Menguraikan materi-materi yang terkait dengan pembelajaran Radar dan Navigasi terkini |
| **Bahan Kajian:** Materi pembelajaran | Prinsip Dasar Radar; Pulse Doppler Radar dan Mti; Tracking Radar; Pendeteksian Sinyal dan Noise Pada Radar; Propagasi Gelombang Radar; Peralatan Radar; Radar Sekunder; Sistem Navigasi Konvensional; Sistem Navigasi General; Sistem Navigasi Satelit; Pensinyalan dan Pemrosesan Sistem Navigasi Satelit; Mahasiswa dapat mengerjakan latihan tentang kalkulasi jarak dalam gps; Mahasiswa memahami perkembangan teori perkembangan sistem gnss; Mahasiswa memahami sistem gnss lainnya |
| **Pustaka** | **Utama:** |  |
| 1. |
| **Pendukung:** |  |
| 1. |
| **Dosen Pengampu** |  |
| **Matakuliah syarat** |  |

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| **Mg Ke-** | **Kemampuan akhir tiap tahapan belajar (Sub-CPMK)** | **Penilaian** | **Bantuk Pembelajaran;****Metode Pembelajaran;****Penugasan Mahasiswa;****[ Estimasi Waktu]** | **Materi Pembelajaran****[Pustaka]** | **Bobot Penilaian (%)** |
| **Indikator** | **Kriteria & Teknik** |
| **(1)** | **(2)** | **(3)** | **(4)** | **Tatap Muka(5)** | **Daring (6)** | **(7)** | **(8)** |
| 1 | Mahasiswa menguasai teori prinsip dasar radar | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

PT [(1x(2x60”)]**Task 3:***Restating the information obtained in the form of an a-150-words paragraph.* **Moda (*Learning Management System*):**elearning@usu.ac.id | TM [(1x(2x50”)]**Kegiatan:**1. *Making notes of the learning materials explained.*
2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

**Media:***Power Point Presentation (PPT)**Zoom Meeting* *Audio Recording**English Handout***Metode Pembelajaran:**1. *Online Lecture*
2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Prinsip Dasar Radar**Referensi:****Mohon diisikan** | 5% |
| 2 | Mahasiswa memahami pulse doppler radar dan mti | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

**Media:***Power Point Presentation (PPT)**Zoom Meeting* *Audio Recording**English Handout***Metode Pembelajaran:**1. *Online Lecture*
2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Pulse Doppler Radar dan Mti**Referensi:** | 5% |
| 3 | Mahasiswa menguasai tracking radar | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

PT [(1x(2x60”)]**Task 3:***Restating the information obtained in the form of an a-150-words paragraph.* **Moda (*Learning Management System*):**elearning@usu.ac.id | TM [(1x(2x50”)]**Kegiatan:**1. *Making notes of the learning materials explained.*
2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

**Media:***Power Point Presentation (PPT)**Zoom Meeting* *Audio Recording**English Handout***Metode Pembelajaran:**1. *Online Lecture*
2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Tracking Radar**Referensi:** | 5% |
| 4 | Mahasiswa mampu menerapkan teori pendeteksian sinyal dan noise pada radar | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

**Media:***Power Point Presentation (PPT)**Zoom Meeting* *Audio Recording**English Handout***Metode Pembelajaran:**1. *Online Lecture*
2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Pendeteksian Sinyal dan Noise Pada Radar**Referensi:** | 5% |
| 5 | Mahasiswa dapat mengerjakan latihan tentang propagasi gelombang radar | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

PT [(1x(2x60”)]**Task 3:***Restating the information obtained in the form of an a-150-words paragraph.* **Moda (*Learning Management System*):**elearning@usu.ac.id | TM [(1x(2x50”)]**Kegiatan:**1. *Making notes of the learning materials explained.*
2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

**Media:***Power Point Presentation (PPT)**Zoom Meeting* *Audio Recording**English Handout***Metode Pembelajaran:**1. *Online Lecture*
2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Propagasi Gelombang Radar**Referensi:** | 5% |
| 6 | Mahasiswa memahami perkembangan teori peralatan radar | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

**Media:***Power Point Presentation (PPT)**Zoom Meeting* *Audio Recording**English Handout***Metode Pembelajaran:**1. *Online Lecture*
2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Mahasiswa memahami perkembangan teori peralatan radar**Referensi:** | 5% |
| 7 | Mahasiswa dapat mempresentasikan pengetahuan radar sekunder | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

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2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Radar Sekunder**Referensi:** | 5% |
| 8 | UJIAN TENGAH SEMESTER |  |  |  |  |  |  |
| 9 | Mahasiswa menguasai teori sistem navigasi konvensional | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

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2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Sistem Navigasi Konvensional**Referensi:** | 5% |
| 10 | Mahasiswa memahami sistem navigasi general | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

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2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Sistem Navigasi General**Referensi:** | 5% |
| 11 | Mahasiswa menguasai sistem navigasi satelit | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

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2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Sistem Navigasi Satelit**Referensi:** | 5% |
| 12 | Mahasiswa mampu menerapkan teori pensinyalan dan pemrosesan sistem navigasi satelit | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

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2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Pensinyalan dan Pemrosesan Sistem Navigasi Satelit**Referensi:** | 5% |
| 13 | Mahasiswa dapat mengerjakan latihan tentang kalkulasi jarak dalam gps | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
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4. *Discussing the exercises completed.*

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2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Kalkulasi Jarak Dalam Gps**Referensi:** | 5% |
| 14 | Mahasiswa memahami perkembangan teori perkembangan sistem gnss | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

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3. *Completing all the provided exercises individually.*
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2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Perkembangan Sistem Gnss**Referensi:** | 5% |
| 15 | Mahasiswa memahami sistem gnss lainnya | 1. *The accuracy in providing the information required*
2. *The student’s fluency in reading the memo (spelling, intonation, and speed)*
3. *The correctness of the student’s answers*
 | **Kriteria:***Marking Scheme***Bentuk:***Worksheet* (Non-Tes)1. *Reading the memo provided.*
2. *Responding to the opening questions given.*
3. *Completing the table (problem-solution) according to the information in the memo.*
4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*

*Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]**Kegiatan:**1. *Reviewing the previous lessons.*
2. *Reading the added learning materials.*
3. *Recording the presence.*
4. *Responding to opening questions in the ‘Discussion Forum’ section.*
5. *Submitting the assigned tasks.*

PT [(1x(2x60”)]**Task 3:***Restating the information obtained in the form of an a-150-words paragraph.* **Moda (*Learning Management System*):**elearning@usu.ac.id | TM [(1x(2x50”)]**Kegiatan:**1. *Making notes of the learning materials explained.*
2. *Responding to the questions or instructions given.*
3. *Completing all the provided exercises individually.*
4. *Discussing the exercises completed.*

**Media:***Power Point Presentation (PPT)**Zoom Meeting* *Audio Recording**English Handout***Metode Pembelajaran:**1. *Online Lecture*
2. *Discussion*
3. *Self-Paced*

*Learning* | **Pokok Bahasan:**Sistem Gnss Lainnya**Referensi:** | 5% |
| 16 | UJIAN AKHIR SEMESTER |  |  |  |  |  |  |
|  | Total  | **100** |