

| Course Code                    | TKIE 162102   |  |                        |                           |  |  |          |                  |            |              |
|--------------------------------|---|--|------------------------|---------------------------|--|--|----------|------------------|------------|--------------|
| Course Name                    | Signals and Systems   |  |                        |                           |  |  |          |                  |            |              |
| Course Instructors             | Samiadji Herdjunanto; Bondhan Winduratna  |  |                        |                           |  |  |          |                  |            |              |
| Course Type                    | Required  |  |                        |                           |  |  |          |                  |            |              |
| Course Classification          | Engineering Topics  |  |                        |                           |  |  |          |                  |            |              |
| Credit / Contact Hour per Week | 4 / 200 minutes per Week  |  |                        |                           |  |  |          |                  |            |              |
| Course Description             | This course will discuss signals transformations and systems characters that applicable to solve complex program in engineering.  |  |                        |                           |  |  |          |                  |            |              |
| Prerequisites Courses          |   |  |                        |                           |  |  |          |                  |            |              |
| Covered Student Outcome        | <b>Fundamental and Engineering Knowledge (a)</b><br><b>Development of Engineering Solution (b)</b>  |  |                        |                           |  |  |          |                  |            |              |
| Learning Outcome               | <ol style="list-style-type: none"> <li>1. Students are able to analyse the stability of a linear time invariant system using transform method.</li> <li>2. Students are able to apply Laplace transform, Fourier transform and Z-transform to solve Engineering problem.</li> <li>3. Students are able to make use of convolution to get output on linear time invariant system.</li> <li>4. Students are able to apply concept of state variable to examine the characteristics of a linear time invariant system</li> </ol>   |  |                        |                           |  |  |          |                  |            |              |
| Topic                          | <ol style="list-style-type: none"> <li>1. Overview of signals and systems</li> <li>2. Concepts of signals and types of systems</li> <li>3. Response of LTI systems in time domain: using convolution</li> <li>4. Feedback concept: for reducing effect disturbance on the output of a system.</li> <li>5. Modeling: differential equation and state variables</li> <li>6. Laplace transform Properties : Unilateral and Bilateral</li> <li>7. Laplace transform : solving problem of LTI system and its stability.</li> <li>8. Fourier Transform: properties</li> <li>9. Frequency response</li> <li>10. Discrete-time system: difference equation, LTI</li> <li>11. Z-transform: properties</li> <li>12. Z-transform: solution to LTI discrete-time system</li> <li>13. LTI discrete-time system: pole and zero, stability</li> <li>14. System Analogy: to electric systems</li> </ol> |  |                        |                           |  |  |          |                  |            |              |
| Direct Assessment              | <table border="1"> <thead> <tr> <th>Direct Assessment Plan</th> <th>Measured Learning Outcome</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td>Mid Exam</td> <td>LO2, LO3,LO4,LO5</td> </tr> <tr> <td>Final Exam</td> <td>LO1, LO2,LO4</td> </tr> </tbody> </table>  |  | Direct Assessment Plan | Measured Learning Outcome |  |  | Mid Exam | LO2, LO3,LO4,LO5 | Final Exam | LO1, LO2,LO4 |
| Direct Assessment Plan         | Measured Learning Outcome   |  |                        |                           |  |  |          |                  |            |              |
|                                |   |  |                        |                           |  |  |          |                  |            |              |
| Mid Exam                       | LO2, LO3,LO4,LO5  |  |                        |                           |  |  |          |                  |            |              |
| Final Exam                     | LO1, LO2,LO4  |  |                        |                           |  |  |          |                  |            |              |
| Indirect Assessment            | Questionnaire (EDOM)  |  |                        |                           |  |  |          |                  |            |              |
| References                     | <ol style="list-style-type: none"> <li>[1] Oppenheim, Allan V.; Willsky, Ian, 1987, <i>Signals and Systems</i>, New Delhi, Prentice Hall of India</li> <li>[2] Kamen, Edward W. ; Heck, Bonnie S., 1997, <i>Fundamentals of Signals and systems using Matlab</i>, New Jersey, Printice Hall</li> </ol>  |  |                        |                           |  |  |          |                  |            |              |