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| <b>Course</b> | Name     | : Telecommunication Laboratory |
|               | Code     | : EE184731                     |
|               | Credits  | : 3                            |
|               | Semester | : VII                          |

### Description of Course

The course gives students the ability to measure, test and analyze the characteristics of existing equipment in the field of telecommunications and conduct digital signal processing as well as network and internet protocol engineering practically using hardware and software simulators. The material studied includes measuring and analyzing the characteristics of a simple antenna dipole  $\lambda / 2$ , conducting an antenna polarization test, measuring the effect of distance antenna with a detector in radiation strength, measuring reciprocity antenna, and matching impedance, generating and analyzing baseband digital signal characteristics, detection optimum, passband modulation and demodulation and cyclic channel coding techniques, as well as LAN / WAN networks, VPN, service infrastructure, network performance and services.

### Learning Outcomes

#### Knowledge

(P03) Mastering the concepts and principles of design procedure in power systems, control systems, multimedia telecommunications, or electronics.

#### Specific Skill

(KK02) Able to describe the completion of engineering problems in power systems, control systems, multimedia telecommunications, or electronics.

#### General Skill

(KU05) Able to take decisions appropriately in the context of problem solving in the area of expertise based on the results of information and data analysis.

#### Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

### Course Learning Outcomes

#### Knowledge

Mastering measurement techniques and demonstrating antenna parameter characteristics, mastering communication signal processing techniques digitally, and practicing network and internet protocol engineering practically.

#### Specific Skill

Able to analyze the parameters of antenna measurements against its performance, able to process communication signals for digital transmission and its characteristics, and master the network and internet protocol engineering practically.

#### General Skill

Able to use: antenna practicum module and record its parameters, communication signal processing practicum module and analyze its characteristics, network practicum module and internet protocol engineering.

#### Attitude

Demonstrating attitude of responsibility on work in his/her field of expertise independently.

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Working together to be able to make the most of his/her potential.

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### Main Subjects

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1. Characteristics of Simple Dipole Antenna  $\lambda / 2$
  2. Antenna Polarization Test Procedure
  3. Characteristics of Antenna Distance with Detectors in the Power of Radiation
  4. Reciprocity of the Antenna
  5. Design of antenna impedance adjusters using the Matching Stub technique.
  6. Type and Characteristics of baseband signals.
  7. Characteristics of Matched filters and Corelators for optimal detection of Maximum Likelihood of digital signals.
  8. Characteristics of a binary passband modulation signal.
  9. Characteristics of the passband modulation signal m-ary.
  10. Cyclic code channel coding.
  11. LAN Implementation
  12. WAN Implementation
  13. VPN Implementation
  14. Network performance and IP-based services
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### Reference(s)

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- [1] "Antenna Trainer", BYTRONIC Education Technology
  - [2] Kwonhue Choi and Huaping Liu, "Problem-Based-Learning-in-Communication-Systems-Using-MATLAB-and-Simulink", John Wiley & Sons, Inc., Hoboken, New Jersey, 2016.
  - [3] John G. Proakis, Masoud Salehi and Gerhard Bauch, Contemporary Communication Systems using MATLAB, 3rd edition, Cengage Learning, 2013.
  - [4] Mathuranathan Viswanathan , Simulation of Digital Communication systems using MATLAB, 2nd Edition, Mathuranathan Viswanathan at Amazon, 2013.
  - [5] Cisco Secure Router 520 Series Software Configuration Guide, Cisco Systems, Inc, 2008
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### Prerequisite(s)

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EE184532 Electromagnetic Wave Transmission and Antennas  
EE184631 Communication Systems 2  
EE184936 Internet Engineering and Web

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