

**49. Antenna and Microwave Engineering Laboratory (EE124IU)**

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| Module designation | <i>Antenna & Microwave Engineering Practical Workbook covers a variety of experiments that are designed to aid students in their profession and theory. They include a variety of topics which include antennas, transmission lines and microwave waveguides. A practical exposure to such equipment is necessary as it builds on the theory taught to students.</i> |
| Semester(s) in which the module is taught | 1, 2 |
| Person responsible for the module | MSc. Trần Văn Sư |
| Language | English |
| Relation to curriculum | Compulsory |
| Teaching methods | Laboratory, lesson, assignment. |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 55 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): laboratory: 25 Private study including examination preparation, specified in hours: 30 |
| Credit points/ECTS | 1 credits/2 ECTS |
| Required and recommended prerequisites for joining the module | Parallel course: Antenna and Microwave Engineering (EE105IU) |



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| Module objectives/intended learning outcomes | Upon the successful completion of this course students will be able to: | |
| | Competency level | Course learning outcome (CLO) |
| | Knowledge | CLO1. Use simulation software to design antennas |
| | Skill | CLO2. Define and analyze the radiation characteristics of antennas (input impedance, gain, half power beam width, and radiation power, polarization...). CLO3. Measure and record the experimental data, analyze the results, and prepare a formal laboratory report. CLO4. Explain to colleagues, through both written and verbal presentations, technical materials as presented in this course |
| | Attitude | CLO5. Analyze and design topics of microwave engineering such as transmission line, Smith chart, scattering matrix |



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| Content | <p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: laboratory session (4 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> | | |
| | Topic | Weight | Level |
| | Dipole antenna simulation using HFSS | 1 | I, T,U |
| | Patch antenna simulation using HFSS | 1 | I, T,U |
| | Experimentation with Pyramidal horn and Helical antennas | 1 | I, T,U |
| | Standing Wave & SWR Measurements. | 1 | I, T,U |
| | Transmission lines | 1 | I, T,U |
| | Matching and transformation network. | 1 | I, T,U |
| | Introduction to RF Anechoic chamber and Network analyzer equipment | 1 | I, T,U |
| | Review | 1 | T,U |
| Examination forms | Exam | | |
| Study and examination requirements | <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p> | | |



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| Reading list | <p>Textbook:</p> <p>[1] Class notes</p> <p>[2] Laboratory Manual supplied by the instructor.</p> <p>Reference:</p> <p>[3] Antenna Fundamentals – Lab-Volt’s Document.</p> <p>[4] Microwave Fundamentals – Lab-Volt’s Document.</p> |
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