

Advanced Antenna Theory - Web course

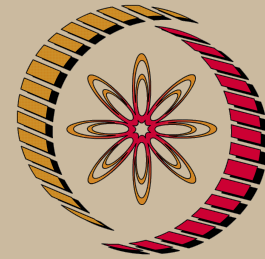
COURSE OUTLINE

The objective of this course is to provide an in-depth understanding of modern antenna concepts, and practical antenna design for various applications. The course will explain the theory of different types of antennas used in communication systems. Starting from the basic antenna parameters, the course will discuss various types of antennas including the planar printed antennas. An in-depth study will be made for the analysis and design of arrays. A brief introduction of smart antenna concept will be given at the end with a view that the student can further explore the topic, if interested.

Contents: Fundamental concepts, Basic antenna parameters, Radiation from wires and loops, Aperture and Reflector Antennas, Broadband Antennas, Microstrip Antennas, Antenna Arrays, Basic Concept of Smart Antennas.

COURSE DETAIL

| Sl. No. | Topic | No. of Hours |
|---------|--|--------------|
| 1. | Fundamental Concepts: Physical concept of radiation, Radiation pattern, near- and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions. | 8 |
| 2. | Radiation from Wires and Loops: Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop. | 7 |



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Electronics & Communication Engineering

Pre-requisites:

1. Engineering Electromagnetics.

Additional Reading:

1. R. E. Collin, "Antennas and Radio Wave Propagation", McGraw-Hill, 1985.
2. F. B. Gross, "Smart Antennas for Wireless Communications", McGraw-Hill, 2005.

Coordinators:

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| 3. | Aperture Antennas: Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts. | 4 |
| 4. | Broadband Antennas: Broadband concept, Log-periodic antennas, frequency independent antennas. | 3 |
| 5. | Microstrip Antennas: Basic characteristics of microstrip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas. | 6 |
| 6. | Antenna Arrays: Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays. | 9 |
| 7. | Basic Concepts of Smart Antennas: Concept and benefits of smart antennas, Fixed weight beamforming basics, Adaptive beamforming | 6 |
| | Total | 43 |

References:

1. C. A. Balanis, "Antenna Theory and Design", 3rd Ed., John Wiley & Sons., 2005.
2. W. L. Stutzman, and G. A. Thiele, "Antenna Theory and Design", 2nd Ed., John Wiley & Sons., 1998.
3. R. S. Elliot, "Antenna Theory and Design", Revised edition, Wiley-IEEE Press., 2003.