EE 4108
Fundamentals of Antenna Design

http://www.cityu.edu.hk/ug/current/course/EE4108.htm
Course Aim and Intended Learning Outcomes (CILOs)

Course Aims

To provide students with essential techniques for the analysis and design of popular antennas for modern wireless communications. Emphasis is placed on the understanding of principles of operation. Basic measurement techniques will be learned.

Course Intended Learning Outcomes (CILOs)

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<thead>
<tr>
<th>No</th>
<th>CILOs</th>
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<tbody>
<tr>
<td>1</td>
<td>Describe and analyze some simple radiating systems</td>
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<td>2</td>
<td>Analyze basic antenna arrays</td>
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<td>3</td>
<td>Describe the general characteristics of high gain antennas</td>
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<td>4</td>
<td>Describe the general characteristics of broadband antennas</td>
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<td>5</td>
<td>Design dipole antennas, slot antennas and microstrip antennas</td>
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<td>6</td>
<td>Design small antennas</td>
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Assessment

Continuous Assessment: 40%
Examination: 60%

A two-hour examination will take place on completion of the course. The continuous assessment consists of assignments (10%), a mini-project (10%) and a test (20%).

Text


Teaching Mode

3-hour lecture per week

Background Knowledge

Basic knowledge of the transmission line equations and electromagnetic theory.
Course Syllabus

Antenna Fundamentals
Overview, Wave equation and its solution, Hertzian dipole, transmitting antenna parameters, receiving antenna, antenna polarization, antenna measurement

Wire antennas
Electrically-small dipole, half-wave dipole, monopole, balun, folded dipole, loop antennas

Antenna arrays
Array factors, pattern multiplication, uniform array, mutual coupling, scan blindness, multidimensional array, feed network, switched-beam array
Course Syllabus (continued)

**High gain antennas**
Yagi-uda antenna, corner reflector antenna, Fresnel zone plate antenna

**Broadband antennas**
Travelling-wave antenna, helical antenna, frequency-independent antennas

**Aperture antennas**
Fields as sources of radiation, Huygen’s Principle, horn antenna, slot antenna, reflector antennas

**Microstrip antennas**
Basic characteristics, transmission line model, cavity model, feed techniques, bandwidth enhancement techniques, size reduction techniques, PIFA
Compact Range
Near Field Systems
Typical Antennas

Microstrip Patch Antennas
Typical Antennas

Reflector antennas
Typical Antennas

Dielectric Resonator Antennas