Cleveland State University
Department of Electrical Engineering and Computer Science

EEC 460: Engineering Electromagnetics

Catalog Description: EEC 460 Engineering Electromagnetics (4-0-4).
Prerequisites: PHY 244 and EEC 361.
Fundamental laws of electromagnetic fields: Gauss’s, Faraday’s, Ampere’s, and Biot-Savart’s. Maxwell’s equations as applicable to finite and infinitesimal regions in three-dimensional space and their engineering implications. Source distribution and boundary value engineering problems and their analytical or numerical solution. Electromagnetic waves propagation. Applications to the design of transmission lines, waveguides, and antennas.


References:

Coordinator: Dr. Ana Stankovic, Professor of Electrical Engineering and Computer Science

Program Objectives and Outcomes fulfilled:

Computer Engineering: None

Electrical Engineering:

Objectives: 1) Practice electrical engineering in the areas of communication systems, digital electronics systems, control systems, and energy and power systems.
2) Define and diagnose problems, and provide and implement electrical engineering solutions in industry, business, and government
3) Observe engineering ethics in the practice of electrical engineering
Outcomes:
(a) An ability to apply knowledge of mathematics, science, and engineering to all areas of electrical engineering
(c) An ability to design a system, component, or process to meet engineering design needs.
(e) An ability to identify, formulate, and solve electrical engineering problems
(f) An understanding of professional and ethical responsibility
(i) Recognition of the need for, and an ability to engage in lifelong learning
(k) An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.

Contribution of course to meeting the Professional Component:

Mathematics and Basic Science: 1 credits;
Engineering topics: 3 credits;
General Education: 0 credits

Prerequisite by Topics:
1. Vector algebra and calculus
2. Coordinate systems and transformations
3. Basic laws of electricity and magnetism

<table>
<thead>
<tr>
<th>Topics</th>
<th>Lecture hours</th>
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<tbody>
<tr>
<td>1. Review of prerequisite topics</td>
<td>6</td>
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<tr>
<td>2. Electrostatic fields</td>
<td>5</td>
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<tr>
<td>3. Engineering electrostatics</td>
<td>4</td>
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<tr>
<td>4. Magnetostatic fields</td>
<td>5</td>
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<tr>
<td>5. Electrodynamics and Maxwell’s equations</td>
<td>4</td>
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<td>6. Magnetic vector potential and energy</td>
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<tr>
<td>7. Engineering magnetostatics</td>
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<tr>
<td>8. Electromagnetic wave propagation</td>
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<td>9. Transmission lines</td>
<td>6</td>
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<td>10. Waveguides</td>
<td>6</td>
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<tr>
<td>11. Antennas</td>
<td>6</td>
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<tr>
<td>12. Exams</td>
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<td>Total</td>
<td>60</td>
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Computer Usage: Computer projects involving MAPLE and MAXWELL

Laboratory Projects: None

Prepared by: F. Eugenio Villaseca, Professor
             December 12, 2008