

Ankara Üniversitesi  
Kütüphane ve Dokümantasyon Daire Başkanlığı

Açık Ders Malzemeleri

PHYS 401 Electromagnetic Theory I - Çalışma Planı (Çalışma Takvimi) Prof.Dr.A.Ulvi Yılmaz

Haftalar	Haftalık Konu Başlıkları
1.Hafta	<b>Overview</b>
	Overview of Maxwell equations, treatment of the boundary conditions in various media. <ul style="list-style-type: none"><li>○ Waves in one dimension, boundary conditions, reflections and transmissions, polarization</li></ul>
2.Hafta	<b>Electromagnetic waves in vacuum</b>
	<ul style="list-style-type: none"><li>○ Electromagnetic waves in vacuum, wave equations for <b>E</b> and <b>B</b>, monochromatic plane waves</li><li>○ Energy and momentum in electromagnetic waves</li></ul>
3.Hafta	<b>Electromagnetic waves in matter -1</b>
	<ul style="list-style-type: none"><li>○ Electromagnetic waves in matter, propagation in linear media.</li><li>○ Reflection and transmission at normal incidence</li><li>○ Refraction</li><li>○ Reflection and transmission at oblique incidence, Fresnel's equations</li></ul>
	<b>Electromagnetic waves in matter -2</b>
	<ul style="list-style-type: none"><li>○ Electromagnetic waves in conducting medium</li><li>○ Reflection at a conducting surface</li><li>○ Frequency dependence of the index of refraction</li><li>○ Phase and group velocities, absorption and dispersion</li><li>○ Anomalous dispersion</li></ul>
5.Hafta	<b>Guided waves</b>
	<ul style="list-style-type: none"><li>○ Wave guides</li><li>○ TE waves in a rectangular waveguide</li><li>○ TM modes, TEM modes in coaxial transmission line</li><li>○ Resonant cavities</li><li>○ Schumann resonance</li></ul>
	<b>Potentials and fields</b>
	<ul style="list-style-type: none"><li>○ Philosophy of the potential formulation</li><li>○ Scalar and vector potentials</li><li>○ Gauge transformations</li><li>○ Choice of gauges, Coulomb and Lorentz gauges</li></ul>
	<b>Continuous charge distributions, retarded potentials</b>
<ul style="list-style-type: none"><li>○ Retardation effect in potential formula</li><li>○ Jefimenko's equations</li></ul>	
8.hafta	<b>Liénard-Wiechert potentials</b>
	<ul style="list-style-type: none"><li>○ Point charges</li><li>○ The fields of a moving point charge</li><li>○ Fields and analysis of the momentum conservation and Newton's third law</li></ul>
	<b>Topological effects in electromagnetism</b>
9.Hafta	<ul style="list-style-type: none"><li>○ Aharonov-Bohm effect</li><li>○ Aharonov-Casher effect</li><li>○ Comparison of the roles of potentials in classical electrodynamics and quantum mechanics</li></ul>

Haftalar	Haftalık Konu Başlıkları
10.Hafta	<p data-bbox="306 271 424 297"><b>Radiation</b></p> <ul data-bbox="306 320 628 427" style="list-style-type: none"> <li data-bbox="306 320 608 347">○ Electric dipole radiation</li> <li data-bbox="306 356 576 383">○ Radiation resistance</li> <li data-bbox="306 392 628 418">○ Magnetic dipole radiation</li> </ul>
11.Hafta	<p data-bbox="306 439 703 465"><b>Radiation from arbitrary sources</b></p> <ul data-bbox="306 477 716 622" style="list-style-type: none"> <li data-bbox="306 477 716 504">○ Power radiated by a point charge</li> <li data-bbox="306 512 525 539">○ Larmor formula</li> <li data-bbox="306 548 620 575">○ Liénard's generalization</li> <li data-bbox="306 584 592 611">○ Synchrotron radiation</li> </ul>
12.Hafta	<p data-bbox="306 633 671 660"><b>Radiation in dielectric medium</b></p> <ul data-bbox="306 669 544 734" style="list-style-type: none"> <li data-bbox="306 669 544 696">○ Cherenkov effect</li> <li data-bbox="306 705 528 732">○ Bremsstrahlung</li> </ul>
13.Hafta	<p data-bbox="306 745 528 772"><b>Radiation reaction</b></p> <ul data-bbox="306 781 730 891" style="list-style-type: none"> <li data-bbox="306 781 636 808">○ Abraham-Lorentz formula</li> <li data-bbox="306 817 568 844">○ Run away solutions</li> <li data-bbox="306 853 730 880">○ Physical basis of radiation reaction</li> </ul>
14.Hafta	<p data-bbox="306 902 560 929"><b>Magnetic monopoles</b></p> <ul data-bbox="306 938 863 1081" style="list-style-type: none"> <li data-bbox="306 938 863 965">○ Maxwell equations and duality transformations</li> <li data-bbox="306 974 636 1001">○ Dirac magnetic monopole</li> <li data-bbox="306 1010 576 1037">○ Charge quantization</li> <li data-bbox="306 1046 592 1072">○ Search for monopoles</li> </ul>