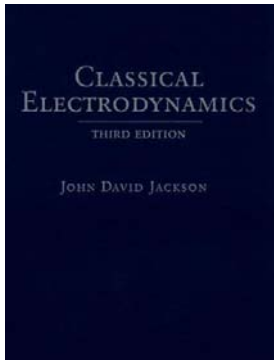


**THE UNIVERSITY OF TEXAS AT EL PASO
COLLEGE OF SCIENCE
DEPARTMENT OF PHYSICS**

Course #:	PHYS 5341 CRN 20216													
Course Title:	Electrodynamics													
Credit Hrs:	3.0													
Term:	Spring 2024													
Course Meetings & Location:	Mon & Wed 1:30 PM – 2:50 PM, Health Science/School of NURS 216													
Instructor:	Dr. Felicia S. Manciu													
Office Location:	PSCI 221 B													
Contact Info:	Phone # : (915) 747 8472													
	E-mail address: fsmanciu@utep.edu													
	Fax #: (915) 747 5447													
	Emergency Contact: (915) 747 5715													
Office Hrs:	Mon & Wed 12:30 PM – 1:30 PM													
Textbook(s), Materials:	<p>Main textbook: Classical Electrodynamics, by John David Jackson, Third Edition, John Wiley & Sons, Inc..</p>													
Course Objectives (Learning Outcomes):	<p>The objective of the class is to provide students with a deeper understanding and improved technical abilities in problem-solving and analytical methods of graduate-level electricity and magnetism.</p> <p>We will study the following topics: Electrostatics, Boundary-value problems, Multipoles, Electrostatics of macroscopic media, Dielectrics, Magnetostatics, Quasi-statics fields, Maxwell Equations, Macroscopic Electromagnetism, Conservation Laws.</p>													
Grading Policy:	<p>Grades in this course will be based on your scores on two midterm exams, a final exam (comprehensive, but with emphasis on the last part of the course), homework assignments, and a final presentation on the applicability of electrodynamics in your research.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Midterm exams:</td> <td>50%</td> <td>(25% each)</td> </tr> <tr> <td>Final exam:</td> <td>25%</td> <td>(comprehensive)</td> </tr> <tr> <td>Homework:</td> <td>20%</td> <td></td> </tr> <tr> <td>Presentation</td> <td>5%</td> <td></td> </tr> </table>		Midterm exams:	50%	(25% each)	Final exam:	25%	(comprehensive)	Homework:	20%		Presentation	5%	
Midterm exams:	50%	(25% each)												
Final exam:	25%	(comprehensive)												
Homework:	20%													
Presentation	5%													

<p>Course Activities/Assignments:</p>	<p>Homework</p> <p>Students must become well versed in problem-solving methods, which means developing the writing skills to set up a problem, including diagrams and mathematical manipulation to achieve the final answer. A numerical score will be assigned for each homework set.</p>
<p>Course Activities/Assignments:</p>	<p>Feel free to form study groups with your classmates and seek help from your lecture professor during her office hours. Make sure that you understand the solutions and write them up yourself. <u>There is a strong correlation between homework scores and exam scores!</u></p> <p>Exams</p> <p>Exams will consist of problems similar to the worked examples in class and the assigned homework problems. <u>Exams will be open book but closed notes.</u></p> <p>The best way to prepare for the exams is to study the example problems and work out the assigned homework problems regularly.</p>
<p>Make-up Policy:</p>	<p>An extension of the due date for the homework as well as the make-up of missing exams will be granted only in extraordinary circumstances.</p>
<p>Course Schedule:</p>	<p>CHAPTER 0 – <u>REVIEW OF VECTOR CALCULUS</u></p> <p>CHAPTER 1 – <u>INTRODUCTION TO ELECTROSTATICS</u></p> <ul style="list-style-type: none"> • 1.1 Coulomb's Law • 1.2 Electric Field • 1.3 Gauss's Law • 1.4 Differential Form of Gauss's Law • 1.5 Another Equation of Electrostatics and the Scalar Potential • 1.6 Surface Distribution of Charges and Discontinuities in the Electric Field • 1.7 Poisson and Laplace Equations • 1.8 Green's Theorem • 1.9 Uniqueness of the Solution with Dirichlet or Neumann Boundary Conditions • 1.10 Formal Solution of Electrostatic Boundary-Value Problem with Green Function • 1.11 Electrostatic Potential Energy and Energy Density <p>CHAPTER 2 – <u>BOUNDARY-VALUE PROBLEMS IN ELECTROSTATICS: I</u></p> <ul style="list-style-type: none"> • 2.1 Method of Images • 2.2 Point Charge in the Presence of a Grounded Conducting Sphere • 2.3 Point Charge in the Presence of a Charged, Insulated, Conducting Sphere

Course Schedule:
(continued)

- 2.4 Point Charge Near a Conducting Sphere at Fixed Potential
- 2.5 Conducting Sphere in a Uniform Electric Field by Method of Images
- 2.6 Green Function for the Sphere, General Solution for the Potential
- 2.7 Conducting Sphere with Hemispheres at Different Potentials
- 2.8 Orthogonal Functions and Expansions
- 2.9 Separation of Variables, Laplace Equation in Rectangular Coordinates
- 2.10 A Two-Dimensional Potential Problem, Summation of Fourier Series
- 2.11 Fields and Charge Densities in Two-Dimensional Corners and Along Edges

CHAPTER 3 – BOUNDARY-VALUE PROBLEMS IN ELECTROSTATICS: II

- 3.1 Laplace Equation in Spherical Coordinates
- 3.2 Legendre Equation and Legendre Polynomials
- 3.3 Boundary-Value Problem with Azimuthal Symmetry
- 3.5 Associated Legendre Functions and the Spherical Harmonics
- 3.6 Addition Theorem for Spherical Harmonics
- 3.7 Laplace Equation in Cylindrical Coordinates, Bessel Functions
- 3.8 Boundary-Value Problems in Cylindrical Coordinates

CHAPTER 4 – MULTIPOLES, ELECTROSTATICS OF MACROSCOPIC MEDIA, DIELECTRICS

- 4.1 Multipole Expansion
- 4.2 Multipole Expansion of the Energy of a Charge Distribution in an External Field
- 4.3 Elementary Treatment of Electrostatics with Ponderable Media
- 4.4 Boundary-Value Problems with Dielectrics
- 4.7 Electrostatic Energy in Dielectric Media

CHAPTER 5 – MAGNETOSTATICS, FARADAY'S LAW, QUASI-STATIC FIELDS

- 5.1 Introduction and Definitions
- 5.2 Biot and Savart Law
- 5.3 Differential Equations of Magnetostatics and Ampere's Law
- 5.4 Vector Potential
- 5.6 Magnetic Fields of a Localized Current Distribution, Magnetic Moment
- 5.7 Force and Torque on and Energy of a Localized Current Distribution in an External Magnetic Induction
- 5.8 Macroscopic Equations, Boundary Conditions of B and H
- 5.15 Faraday's Law of Induction

Attendance Policy:	Attendance is critical for your success in this class. Please notify me of any extenuating circumstances that may prevent your attendance. In the event of an absence, the student must make up and submit any missed work within one week from the absence. It is the student's responsibility to contact the professor immediately to find out how to make up any missing work.
Military Statement:	If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact the instructor at the beginning of the semester.
Academic Integrity Policy:	Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit HOOP: Student Conduct and Discipline .
Netiquette:	Always consider audience. Respect and courtesy must be provided to classmates and to professor at all times. No harassment or inappropriate behavior will be tolerated. Remember that members of the class and the instructor will be reading any online postings. When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation. Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).
Accommodation Policy:	The University is committed to providing reasonable accommodations and auxiliary services to students and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Students who become pregnant may also request reasonable accommodations, in accordance with state and federal laws and regulations and University policy. Accommodations that constitute undue hardship are not reasonable.

Accommodation Policy:
(continued)

Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#) (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the [CASS portal](#).