

# Physics 2321 - Introductory Electromagnetism



Dr. Jorge Lopez



## PHYS 2321 INTRODUCTORY ELECTROMAGNETISM

Spring 2026, CRN 23911, MWF 9:30 – 10:20 PM, PSCI 208

**INSTRUCTOR:** Jorge A. López

**COORDINATES:** Office PSCI 311, 747-7528, [jorgelopez@utep.edu](mailto:jorgelopez@utep.edu)

**OFFICE HOURS:** In my office or online.

- Without appointment: WMF 10:30 AM - 12:30 PM
- With appointment: TT 11:00 - 2:00

### COURSE DESCRIPTION

Introductory Electromagnetism is the second part of a sequence of calculus-based introductory physics courses whose main objectives are to provide students with a rigorous description of electricity and magnetism. It covers charges, electric forces, electric fields and potential, current and magnetism, induction, time varying fields and electromagnetic waves, and improves student's problem-solving abilities.

Class will consist of two 80 min lectures per week with the instructor, and a 1-hour weekly workshop with a Teaching Assistant.

This class should be taken concurrently with a 2-hour weekly laboratory, PHYS 2121, that includes basic laboratory experiments on principles of electricity and magnetism including experimental design, data collection and analysis, and preparation of laboratory reports.

Prerequisite: PHYS 2320 and MATH 1312 (may be taken concurrently with PHYS 2321).

### LEARNING OUTCOMES

At the end of this course, students will be able to understand

- Electric charges, electric forces, Coulomb's law, electric fields
- Electric potential energy, electric potential, Gauss' law,
- Currents, circuits, resistance, resistivity, capacitors, batteries,
- Magnetic fields, sources of magnetic fields, Biot-Savart Law, Ampere's law,
- Induction, AC currents, inductors, RLC circuits, resonance, impedance
- Electromagnetic waves.

### TEXTBOOK AND OTHER MATERIALS

- *Physics for Scientist and Engineers*, Knight, Field, 4rd Ed. or newer.
- Scientific calculator.
- Laptop computer, tablet, or smart phone, with access to Internet to respond to the iClicker questions during class, and to solve the weekly quizzes

- *iClicker*.
  - If you have an iClicker account with your UTEP email address or UTEP ID, then you have been enrolled in the iClicker account for this class, please login into your iClicker account and verify that you are enrolled.
  - If you do not have an iClicker account, or have one under a different email address, please register at <https://www.iclicker.com/> and sign up for PHYS 2321. **You must use your UTEP official name, email and Student ID in your iClicker accounts**, otherwise your iClicker account will not synchronize with your Blackboard account.

## COURSE OVERVIEW

- Ch. 22: Electric charges and forces
- Ch. 23: Electric field
- Ch. 24: Gauss' Law
- Ch. 25: Electric potential
- Ch. 26: Potential and field
- Ch. 27: Current and resistance
- Ch. 28: Fundamentals of circuits
- Ch. 29: Magnetic field
- Ch. 30: Electromagnetic induction
- Ch. 32: AC circuits

## COURSE EVALUATION

- |                               |     |                    |     |
|-------------------------------|-----|--------------------|-----|
| • Weekly quizzes              | 60% | • Seminar/Workshop | 10% |
| • In-class iClicker questions | 10% | • Final exam       | 20% |

**QUIZZES** Weekly quizzes based on the homework and topics covered in the lecture of the previous week will be given through Blackboard every Friday in the last 20 minutes of class. Quizzes must be taken in the classroom, unless a valid excuse is presented to the instructor ahead of time. The quizzes are open-book and open-notes.

**There will be no makeup quizzes.** Instead the lowest two test grades will be dropped. If you miss more than two quizzes and have proper justification (written evidence of medical urgencies, death in family, military duty, etc.) can arrange a re-test. Please do not request make up quizzes or send absence justifications unless you have missed more than two quizzes.

**LABORATORY:** Attending the laboratory is mandatory and the lab grade is independent of the class grade. You will receive instructions from the lab coordinator, Karla Carmona ([kcarmona@utep.edu](mailto:kcarmona@utep.edu)).

**HOMEWORK:** Homework problems will be assigned but not collected nor graded, but solutions may be discussed in the workshop and posted on Blackboard: i) in the PPT lecture files, and ii) on the Yuja Video library (click on Blackboard PHYS 2421 Video Problems).

**IN-CLASS CLICKER QUESTIONS.** We will be using iClicker polling to respond to about 225 multiple-choice questions, using your mobile device. The grade for the iClicker questions is worth 10% of the semester grade

**WORKSHOP:** The grade for the workshop is worth 10% of the semester grade, based on a weekly quiz. You must have registered in one of the following workshops:

- 23913 PHYS 2321 M 13:30 AM – 14:20 PSCI 314
- 23914 PHYS 2321 W 13:30 AM – 14:20 PSCI 314
- 23915 PHYS 2321 Th 13:30 AM – 14:20 PSCI 314
- 23917 PHYS 2321 F 12:30 AM – 13:20 PSCI 314

**FINAL EXAM:** The final exam is comprehensive covering chapters 22 - 32 of the textbook. It will be taken in class using a mobile device.

## CLASS PARTICIPATION

**This is an in-person class.** You will need a computer, laptop or mobile device, with access to Internet to respond to the iClicker questions, and to solve the weekly quizzes.

Attendance is not necessary and does not count in your grade. **Please do not tell me if you cannot come to class.**

## WHAT DO YOU NEED TO DO TO BE SUCCESSFUL IN THE COURSE

- **Pay attention to the weekly e-mail messages from the instructor.**
- The lecture material to be used in class is available in Blackboard ahead of time, download it and study before class. If you print it, you will not need to take notes during class!
- Study ahead, participate in class, ask questions and answer the iClicker questions.
- Do not miss the Thursday quizzes. Old quizzes are available to study in Blackboard.
- Complete the homework early in the week; it will help you in the Thursday quizzes.
- Keep summaries of the material covered, this is helpful to study for the final exam.
- Form a study group with one or more peers, and study together.
- Get help from the Miner Learning Center, see below for instructions.


## MINER LEARNING CENTER

Tutoring for PHYS 2321 is available at the Miner Learning Center (<https://www.utep.edu/mlc/>); if no tutor is available for 2321, request to be tutored for PHYS 1304. MLC tutoring may be done in person or via Zoom. Please contact the MLC for tutoring times, etc.

## OFFICIAL STATEMENTS

<b>Course Activities</b>	Class will be composed of two 80 min lectures with the instructor, and a 50 min workshop.
<b>Excused absences and/or course drop policy</b>	According to UTEP Curriculum and Classroom Policies, "When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class with a grade of "W" before the course drop deadline and with a grade of "F" after the course drop deadline." See academic regulations in the UTEP Undergraduate Catalog for a list of excuse absences. Therefore, if I find that, due to non-performance in the course, you are at risk of failing, I will drop you from the course. I will provide 24 hours advance notice via email.
<b>Incomplete grade policy</b>	Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

<b>Accommodations policy</b>	The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, 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. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the <a href="#">UTEP Center for Accommodations and Support Services</a> (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at <a href="mailto:cass@utep.edu">cass@utep.edu</a> , or apply for accommodations online via the <a href="#">CASS portal</a> .
<b>Covid-19 accommodations</b>	Students are not permitted on campus when they have a positive COVID-19 test, exposure or symptoms. If you are not permitted on campus, you should contact me as soon as possible so we can arrange necessary and appropriate accommodations.  Students who are considered high risk according to CDC guidelines and/or those who live with individuals who are considered high risk may contact <a href="#">Center for Accommodations and Support Services</a> (CASS) to discuss temporary accommodations for on-campus courses and activities.
<b>Covid-19 precautions</b>	Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to <a href="mailto:covidaction@utep.edu">covidaction@utep.edu</a> , so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.  The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit <a href="http://epstrong.org">epstrong.org</a> .
<b>Attendance Policy</b>	Attendance is not taken into account for the grade, but not attending the class will result in missing quizzes and iClicker questions.
<b>Academic Integrity Policy</b>	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 <a href="#">HOOP: Student Conduct and Discipline</a> .
<b>Civility Statement</b>	During class, please do not eat, sleep or read newspapers or any other material not related to class. Turn off cell phones, ipods, and any other devices which might disturb class. Use computers and tablets only for class purposes, and do not talk excessively (definition of "excessive" is up to the instructor)

<b>Disability Statement</b>	If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to <a href="mailto:cass@utep.edu">cass@utep.edu</a> , or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at <a href="http://www.sa.utep.edu/cass">www.sa.utep.edu/cass</a> .
<b>Military Statement</b>	Students being called for military duties need to contact the instructor as soon as possible.
<b>Drop deadline</b>	The College of Science will not approve any drop requests after the deadline date.
<b>Class recordings</b>	The use of recordings will enable you to have access to class lectures, group discussions, and so on in the event you miss a synchronous or in-person class meeting due to illness or other extenuating circumstance. Our use of such technology is governed by the Federal Educational Rights and Privacy Act (FERPA) and UTEP's acceptable-use policy. A recording of class sessions will be kept and stored by UTEP, in accordance with FERPA and UTEP policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. You may not share recordings outside of this course. Doing so may result in disciplinary action.
<b>GUIDANCE ON ARTIFICIAL INTELLIGENCE</b>	Use of AI technologies or automated tools, particularly generative AI such as ChatGPT or DALL-E, is not allowed for assignments in this class. Each student is expected to use critical and creative thinking skills to complete tasks and not rely on computer-generated ideas. Any direct use of AI-generated materials submitted as your own work will be treated as plagiarism and reported to the Office of Student Conduct and Conflict Resolution (OSCCR). <b>AI allowed only with prior permission from instructor.</b>
<b>COURSE RESOURCES</b>	<p><b>Where you can go for assistance</b></p> <p>UTEP provides a variety of student services and support. Please refer to the QR code below for a listing of campus resources.</p> 
<b>Pregnant and parenting students policy</b>	<p><b>Applicability and Prohibited Conduct:</b> The policy prohibits discrimination against pregnant and parenting students. Specific actions like forcing leave of absence, limiting studies, or altering programs due to pregnancy or parenting status are prohibited.</p> <p><b>Reasonable Accommodations:</b> Accommodations may include excused absences, additional assignment time, and safe distance from hazardous activities. Students should contact the Center for Accommodations and Support Services (CASS) at <a href="mailto:cass@utep.edu">cass@utep.edu</a> (915) 747-5148.</p>

**TENTATIVE CALENDAR**

<b>WEEK</b>	<b>CONTENT</b>	<b>OBSERVATIONS</b>	<b>QUIZ</b>
<b>1/19 – 23</b>	<b>Intro + Ch. 22.1 - 3</b>	<b>1/19 Martin Luther King day</b>	<b>No quiz, no lab.</b>
<b>1/26 – 1/30</b>	<b>22.4-5</b>		<b>1: 22.1 – 3</b>
<b>2/2 – 2/6</b>	<b>23.1 - 3</b>		<b>2: 22.4 – 5</b>
<b>2/9 – 2/13</b>	<b>23.4 – 7</b>		<b>3: 23.1 – 3</b>
<b>2/16 – 2/20</b>	<b>24.1 – 6</b>		<b>4: 23.4 – 7</b>
<b>2/23 – 2/27</b>	<b>25.1 – 7</b>		<b>5: 24.1 – 6</b>
<b>3/2 – 3/6</b>	<b>26.1 – 7</b>		<b>6: 25.1 – 7</b>
<b>3/9 – 3/13</b>	<b>27.1 – 5</b>		<b>7: 26.1 – 7</b>
<b>3/16 – 3/20</b>		<b>Spring Break</b>	
<b>3/23 – 3/27</b>	<b>28.1 – 5</b>	<b>3/27 Cesar Chavez day-no classes</b>	<b>8: 27.1 – 5</b>
<b>3/30 – 4/3</b>	<b>28.6 – 9</b>	<b>4/2 Drop deadline 4/3 Spring Study Day-no classes</b>	<b>9: 28.1 – 5</b>
<b>4/6 – 4/10</b>	<b>29.1 – 6</b>		<b>10: 28.6 – 9</b>
<b>4/13 – 4/17</b>	<b>29.7 – 10</b>		<b>11: 29.1 – 6</b>
<b>4/20 – 4/24</b>	<b>30.4 – 10</b>		<b>12: 29.7 – 10</b>
<b>4/27 – 5/1</b>	<b>30.7 – 10</b>		<b>Make-up quiz: Ch. 30</b>
<b>5/4 – 5/8</b>	<b>32</b>	<b>5/8 Dead day</b>	
<b>5/11 – 5/15</b>		<b>5/13 Final exam 10:00 – 12:45 pm</b>	