Please get started:

Applied Physics 50

1. Make an account on Learning Catalytics

Go to learningcatalytics.com
Select Register—> Student —> No MyLab or Mastering
Yes I have an access code:
LCS12-FLAIL-RETRY-BLOCS-GUYOT-TOPES

2. Make an account on Perusall

Go to perusall.com
Login with your Facebook or your email

Click Enter an access code and type your course access code: MILLER-7937.
Applied Physics 50
Applied Physics 50

1 philosophy
2 logistics
Applied Physics 50

1. philosophy
2. logistics
3. team work
information transfer
faculty-centered

1 philosophy

faculty-centered
philosophy
interaction
student-centered
1 philosophy
1st exposure

deeper understanding

1 philosophy
2 logistics
<table>
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Three components:

1  philosophy  
2  logistics
Three components:

• pre-class reading
Three components:

• pre-class reading
• in-class activities
Three components:

• pre-class reading
• in-class activities
• projects
need laptop or tablet!
Information transfer

1. Philosophy
2. Logistics

APP.PERUSALL.COM

CHAPTER 28: Magnetic fields of charged particles in motion

In this chapter, we investigate further the relationship between the motion of charged particles and the occurrence of magnetic fields. As we shall see, all magnetism is due to charged particles in motion, whether moving along a straight line or spinning about an axis. It takes a moving or spinning charged particle to create a magnetic field, and it takes another moving or spinning charged particle to "feel" that magnetic field. We shall also discuss various methods for creating magnetic fields, which have wide-ranging applications in electromechanical machines and instruments.

28.1 Source of the magnetic field

As we saw in Chapter 27, magnetic interactions take place between magnets, current-carrying wires, and moving charged particles. Figure 28.1 summarizes the interactions we have encountered so far. Figures 28.1a–c show the interactions between magnets and current-carrying wires. The sideways interaction between a magnet and a current-carrying wire (Figure 28.1b) is unlike any other interaction we have encountered. The forces between the wire and the magnet are not central—they do not point directly from one object to the other. As we saw in Section 27.7, the magnetic force exerted on a current-carrying wire is the sum of the magnetic forces exerted on many individual moving charge carriers. Similarly, the magnetic field due to a current-carrying wire is the sum of the magnetic fields of many individual moving charge carriers. Figures 28.1d and 28.1e illustrate the magnetic interactions of moving charged particles. Note that for two charged particles moving parallel to each other (Figure 28.1e), there is in addition to an attractive magnetic force, a (much larger) repulsive electric force.

It is important to note that the magnetic interaction depends on the state of motion of the charged particles. No magnetic interaction occurs between a bar magnet and a stationary charged particle (Figure 28.1f); these observations suggest that the motion of charged particles might be the origin of all magnetism. There are two problems with this assumption, however. First, the magnetic field of a wire carrying constant current looks very different from that of a magnet (Compare Figures 27.13 and 27.19). Second, there is no obvious motion of charged particles in a piece of magnetic material.

Figure 28.2a shows the magnetic field
Student 1 – 25 Feb, 04:55PM
Yeah, this is where I’m confused. From the first paragraph: “It takes a moving or spinning charged particle to create a magnetic field…” however there is no obvious motion of charged particles in a piece of magnetic material (bar magnet for example?). How does this reconcile?

Student 2 – 26 Feb, 08:29PM
Maybe they are trying to say that there is no OBVIOUS motion, but they are in fact moving via a current. Therefore, it meets their definition that it takes moving particles to create a magnetic field.

Student 3 – 2 Mar, 09:00AM
I agree that the motion is not “obvious” in that it is not visible to the naked eye. The cause must be atomic.

Student 2 – 2 Mar, 11:37AM
Oh the answers to this question kind of address my question above - I guess there isn’t a force if the particle is stationary, but since even when an object is stationary (thus no obvious motion), there is a magnetic force. It’s when everything, including the particles, are stationary that there is no obvious motion.

Student 4 – 4 Mar, 01:05PM
Is there ever a situation in reality where everything, even the particles are not ...
Read chapter 2 by 11:59 pm Monday September 4

All readings due by 11:59 pm the night of the indicated day!
In-class activities:

- Learning Catalytics
- Tutorials
- Estimation Activities
- Experimental Design Activities
- Problem Set Reflections
- Readiness Assurance Activities
In-class activities

1. philosophy
2. logistics

- Learning catalytic
- Tutorial
- Estimation activity
- Readiness assurance
- Reflection
- Experimental design
# In-class activities

**Schedule**

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**Notes**

1. Philosophy
2. Logistics

**Abbreviations**

- **1-5 unit**
- **T team assignment**
- **P project (proposal) due in class**
- **PW time to work on project in class**
New To AP50 This Year

There is an additional (mandatory) section on Friday. You will be assigned to one of 4 sections depending on the team that you are assigned to.

The 4 section times are:

Friday 9-11 am
Friday 11-1 pm
Friday 1-3 pm
Friday 3-5 pm

You must be available for at least 2 of the 4 section times (to enroll) as your assigned section time might change from one project to another.
### In-class activities

2/3 scaffolded, guided

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**Legend:**

- **T**: team assignment
- **P**: project (proposal) due in class
- **PW**: time to work on project in class

1. philosophy
2. logistics
In-class activities

1/3 unguided

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1 philosophy
2 logistics
### In-class activities

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**Legend:**

- **1** - philosophy
- **2** - logistics

- **1-5** - unit
- **T** - team assignment
- **P** - project (proposal) due in class
- **PW** - time to work on project in class
Assessment:

• self-directed learning
• content mastery
• team work
• professionalism

** use own words in reports!!
Assessment:

- self-directed learning
- content mastery
- teamwork
- professionalism
Assessment:
• self-directed learning
• content mastery
• team work
• professionalism

1 philosophy  2 logistics
Assessment:
• self-directed learning
• content mastery
• team work
• professionalism

1 philosophy         2 logistics

Annotations
Problem sets
RAAs
Project report
Project presentation
Peer Assessment
Participation
Punctuality
Ethics

Scale: 3–0
self-directed learning
content mastery
team work
professionalism
Assessment:
• self-directed learning
• content mastery
• team work
• professionalism

1  philosophy         2  logistics

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1 philosophy         2 logistics
Assessment:
• self-directed learning
• content mastery
• team work
• professionalism

1 philosophy
2 logistics

Scale: 3–0
lowest score
Scale: 3–0
table lookup
Scale: A–E

Annotations
Problem sets
RAAs
Project report
Project presentation
Peer Assessment
Participation
Punctuality
Ethics

self-directed learning
content mastery
team work
professionalism

letter grade

A 2, 2, 2, 2
A− 2, 2, 2, 1
B+ 2, 2, 1, 1
B 2, 1, 1, 1
B− 1, 1, 1, 1
C one zero
D two zeroes
E more than two zeroes
Assessment:
• self-directed learning
• content mastery
• team work
• professionalism
1 philosophy  2 logistics  3 team work
Working as a team

- can solve more difficult problems

1. philosophy
2. logistics
3. teamwork
Working as a team

- can solve more difficult problems
- may have to “conquer and divide”
Working as a team

• can solve more difficult problems
• may have to “conquer and divide”
• individual responsibility

① philosophy  ② logistics  ③ team work
### Readiness Assurance Activity (one per Unit)

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**Class Schedule**

- **INTRO**
- **DRAG RACE**
- **PW**

**Philosophy**

- Aug 31: 1
- Sept 5: T1
- Sept 14: 1
- Sept 19: T2
- Sept 26: 2
- Oct 3: 2
- Oct 10: 3
- Oct 12: 3
- Oct 13: PW

**Logistics**

- Sept 8: 1
- Sept 15: 1 (PW)
- Sept 22: 2
- Sept 26: 2 (PW)
- Oct 6: 3
- Oct 12: 3
- Oct 13: PW

**Team Work**

- Sept 14: 1
- Sept 28: 2 (PW)
- Sept 29: PW
- Oct 3: 2
- Oct 10: 3
- Oct 12: 3 (PW)
- Oct 13: PW

**Additional Notes:**

- **2 hours**
- **Symposium**
how many M&Ms in the jar?
Joining AP50

Complete all enrollment requirements admittance decided by **Tuesday Sept 5, 5pm**

**To Do List for Being Considered in Lottery**

1. create student accounts on Perusall and Learning Catalytics

2. Complete 2 Surveys on Learning Catalytics

3. Annotate chapters 1 & 2 (on Perusall) (see syllabus for details)