Welcome

EF 151
Physics for Engineers 1

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http://ef.utk.edu/ef151

Today’s Topics:
• What is Engineering? Demonstration
• Math review
• Overview of syllabus and web site

Objectives
◆ Provide physics and math fundamentals for engineering
◆ Provide exposure to different engineering disciplines
◆ Learn, participate in, and practice the engineering design process
◆ Learn and have fun!

What is Engineering?
◆ Driving a _______?
◆ The application of scientific principles to practical ends as the design, construction, and operation of efficient and economical structures, equipment, and systems.
◆ “Using ________ and ______ to figure out how to make ______ and do _______."
◆ __________________________

Engineering by Democracy

We want to build a bridge out of wood. What does the max span depend on?

<table>
<thead>
<tr>
<th>Span</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ft</td>
<td></td>
</tr>
<tr>
<td>5 ft</td>
<td></td>
</tr>
<tr>
<td>6 ft</td>
<td></td>
</tr>
<tr>
<td>7 ft</td>
<td></td>
</tr>
<tr>
<td>8 ft</td>
<td></td>
</tr>
<tr>
<td>&gt; 8 ft</td>
<td></td>
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</tbody>
</table>

We take what we know and understand about a ______ part of the world and through the use of formulas, models, and analysis, we are able to predict what will happen in a ______ part of the world.

Types of Engineering at UT
◆ Biosystems Engineering & Soil Science
◆ Chemical & Biomolecular Engineering
◆ Civil & Environmental Engineering
◆ Electrical Engineering & Computer Science
◆ Industrial & Systems Engineering
◆ Materials Science & Engineering
◆ Mechanical, Aerospace & Biomedical Engineering
◆ Nuclear Engineering
◆ Undecided
Math Review

- We assume you are comfortable with Algebra, Geometry, Trigonometry
  - solving equations with one variable
  - solving systems of equations
  - similar triangles
  - angles between lines, parallel, perpendicular
  - length, area, volume
  - triangles, law of sines, law of cosines
  - trigonometry – sin, cos, tan, arc length

- Math Practice Homeworks
  - on-line, multiple due dates, bonus, prorated
  - 0-1 100% due Wednesday, August 19, midnight
  - 1-1 100% due Thursday, August 20, midnight
  - start now!

Algebra Problem

You are designing a water fountain and you need to know when the water reaches a given height (y). The equation from physics that relates height (y, in ft) to time (t, in sec) is
\[ y = 36t - 16.1t^2 \]
Find the time when the height is 18 ft.

\[ t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

Trigonometry Problem

A lazy dog walks from point A, to B, to C.
- How far has the dog walked?
- How far away is the dog from where it started?

\[ \text{MATLAB - trig solution} \]
\[ a = 28; b = 18; \text{th} = 15 + 40; \]
\[ \text{eq} = @(c) -c^2 + a^2 + b^2 - 2*a*b*cosd(th) \]
\[ \text{fsolve}(\text{eq},20) \% 20 \text{ is the guess} \]
\[ \text{x} = 28*cosd(40) - 18*cosd(15); \]
\[ \text{y} = 28*sind(40) + 18*sind(15); \]
\[ \text{d} = \text{sqrt}(x^2 + y^2) \]

Course Details

- ALL information about EF 151 is on the web site http://ef.utk.edu/ef151
- Syllabus
- Textbook
- Clickers
- Announcements
- Office: Perkins 207