ME 402: Using Numbers in Text

Technical writing often includes numbers. Below are a few guidelines for effective use of numbers within written documents.

Numerals or Names?
Numbers within text can be included as either a numeral (e.g., 3) or a name (e.g., three). You should use numerals, not words, when the number is a key value or an exact measured value. This is the most common case in writing laboratory reports. For example, using a numeral is in order for a sentence such as “The predicted time constant is 3.14 seconds.”

Even though the default in technical writing is to use numerals instead of names, there are cases where you should use the words. The most common examples are for inexact numbers or for non-measured quantities. For example, in the sentence “We conducted three experiments.” it is preferable to use the word “three” because this isn’t a measured number.

- Don’t mix the use of numerals and names in the same sentence. For example, the following sentence should be revised.
  We conducted 3 experiments, and two of them are reported in this document.

When using numerals, avoid the following mistakes:

- Don’t start sentences with numeral (or symbols). Write the name of the number or, better yet, rephrase the sentence so it doesn’t begin the sentence.
- For decimal values less than 1, add a 0 before the decimal point: for example, .08 should be 0.08.

Units
With few exceptions, numbers in text, tables and graphs should always include proper units. Make sure to put a space between the number and its units. This includes the percent sign (%).

- All units, including those that are named for a person, have a lower-case first letter when written out (not abbreviated). Thus, write "ohm, farad, coulomb, volt, ampere, hertz" for units.
- The proper abbreviation for "kilohertz" is "kHz": only the "H" is upper case.
- The proper abbreviation for "second" is "s", not "sec".
- The same abbreviation is used for the singular and plural form of a unit.
- A period is not placed after an abbreviated unit, unless it is at the end of the sentence.
- Avoid labeling the axis on a graph or a column in a table as, for example, “volts x 10-3” This is ambiguous: are the numbers to be multiplied by the reader, or has the multiplication already been done?
- In general, choose a metric prefix that will make the numerical value between 0.1 and 1000. However, the value of a parameter or a variable over the range of a few paragraphs or in a table should have the same metric prefix to allow easy comparison of different values.
- Do not use metric prefixes when using scientific notation: e.g., "4 x 10^5 m/s", not "4 x 10^2 km/s".

When specifying the units of numbers arranged in a table, the units are often specified in the header for the column (or row) if the entire column (or row) includes numbers with all the same units. This helps make the table more readable and more succinct as illustrated in Table 1.
Table 1: Results from time response experiment

<table>
<thead>
<tr>
<th>Trial</th>
<th>Time Constant [s]</th>
<th>Natural Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>1.2</td>
<td>123</td>
</tr>
<tr>
<td>Run 2</td>
<td>1.3</td>
<td>132</td>
</tr>
<tr>
<td>Run 3</td>
<td>0.9</td>
<td>142</td>
</tr>
<tr>
<td>Run 4</td>
<td>10.2</td>
<td>12</td>
</tr>
</tbody>
</table>

**Significant Figures**
The number of significant figures used in reporting numerical results implies the precision of the measured or calculated value. Don't make numerical values look more exact than they are.

- If you measured the radius of a cylinder with a ruler as 2.1 cm, this would imply that you were using a measurement device that had a resolution (precision) of roughly 0.1 cm. If you then calculated the area of the cross section, it would not be correct to report that result is 13.8544236 cm², even if you know the value of pi very precisely. The value should be reported as 13.9 cm².

**Further Reading**
There are many very good references for technical writing. Some of them are listed on the course website. The guidelines above borrow heavily from the following two online sources:

- Ronald Standler’s technical writing handout: [http://www.rbs0.com/tw.htm](http://www.rbs0.com/tw.htm)
  - Especially the chapter on common grammar and usage: [http://www.prismnet.com/~hcexres/textbook/gram2.html](http://www.prismnet.com/~hcexres/textbook/gram2.html)