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Writing in Lab Reports for BME 307
Some Examples and Comments

Wordy sentences (see underlined phrases)

It must be ensured that the frequency and voltage recorded by the equipment must be as close to the actual values as possible.

We found that an upper bandpass setting of 30 Hz also seemed to provide adequate recording, and perhaps even a cleaner signal, as can be seen below in Figure 2.

Also, it is important to note that the filter preserves most of signal below 40 Hz.

Sentences revised for conciseness

The frequency and voltage recorded by the equipment must be as close to actual values as possible.

An upper bandpass setting of 30 Hz also provided adequate recording and a slightly cleaner signal, as shown in Figure 2.

Also, the filter preserves most of the signal below 40 Hz.

Example of a long sentence that is easy to read because it is well structured (list appears at the end).

The apparatus for collecting ECG's consisted of the following: silver-silver chloride ECG electrodes (GE Medical Systems Silver Mactrode Plus Model E9001AD / Dymedix Dual Electrode Model 5200-0001) placed on the two wrists and left ankle, a differential amplifier (Isodam Biological B), an isolation amplifier (Texas Instruments ISO122) and a data acquisition (DAQ) board (Data Translation DT9804).

Good use of personal pronouns – doesn't detract from the science, just makes the sentences concise

In this laboratory, we varied sampling rates, analog filters, and digital filters and looked at how these variables affected the QRS peaks. Finally, we wrote four different algorithms in MATLAB for detecting the QRS peaks, and we compared their resilience to different types of noise.

Poor use of personal pronouns --
too much emphasis on the writer rather than the point of the lab; also too informal

The information and skills I learned in this lab will certainly come in handy later in the course. Now, I know how to process biological signals, and how to read a PSD for further information on the signal.

Good introduction – focuses on the purpose of the lab as it relates to science

The electrocardiogram (ECG) is a powerful tool used by clinicians that measures the electrical depolarization of the heart. It is most often used to identify cardiac structure and function. Yet deeper analysis of ECGs can also be used to consider more in depth physiological topics - ranging from heart rate detection, to measuring the electrical axis of the heart.

Unfortunately, there are a variety of complications that can make the ECG data less accurate and difficult use in physiological

analysis. . . . [several short paragraphs follow]

With optimal settings determined, it is then possible to gather more meaningful biological data. In this report, low pass filter optimization was applied for use in two physiological studies: the effect of exercise and the Valsalva maneuver (exhaling while mouth and nose are closed) on heart rate, and measuring the mean QRS axis of the heart.

Poor introduction – personalizes the lab's purpose, focusing on the student team rather than on the science; also use vague language ("we learned how aliasing can affect our signal"; what is that effect?)

Electrocardiograms (EKGs) are an important tool for diagnosing the heart. Therefore being able to take someone's EKG and knowing how to clean up the image as best as possible is a very significant skill. Being able to filter out unwanted frequencies was related to the main purpose of this lab, which was to learn how to take, record, and filter a subject's heart rate via EKG. Learning how to filter a subject's EKG entailed learning how to create digital filters on MATLAB and how to differentiate the frequencies related to the heart and unwanted frequencies. We also learned how aliasing can affect our signal and how to deal with aliasing via sample rate.

Correct uses of past & present tense:
past tense for what the group DID in the past (see underlining), present tense for the result, which happens now and would happen again (see italics)

Next, we passed our signal through a differential amplifier (Iso-Dam-C). The differential amplifier *reduces* noise common to both leads. The amplifier also *has* a very high input impedance (calculated to be 1.5 MΩ with a voltage divider circuit), which *makes* the skin impedance negligible.

Good example of interpretation within the results section
(see italics—writer explains what's important)

From this plot, we see that the apparent frequency is equal to the input frequency for all values of frequency less that the Nyquist rate. Frequency values above the Nyquist rate are aliased into the 0 to 50 Hz region. *This means that* in order to collect a good ECG signal, the sampling rate must be more than double the highest non-noise frequency component of the ECG signal.

Good example: a meaningful caption

Figure 3: Plot of the power spectrum of an ECG. The sampling rate was 1000 Hz and the Nfft was 1028, which gives a frequency resolution of approximately 1 Hz. Note that excluding the 60 Hz noise and its harmonics, the high power frequencies in the ECG are all above 50 Hz.