

# ELEC 3004/7312: Signals Systems & Controls

## PRACTICAL LABORATORY FOUR REPORT

### Due: Friday, June 1, 2012

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**Note:** This practical laboratory report is worth **10%** of the final course mark. Remember that this should be turned in via the submission system.

**Total marks: 100**

1. **[20] Pre-lab**

*Before the laboratory started, there were 4 questions to answer (at the top of Page 2). Please submit answers to these.*

2. **[10] Laboratory Part 1**

This part of the lab asks you to design a filter. What are the final values that you used? Did you change **K**? If so, to what?

3. **[10] Laboratory Part 2**

Do you notice any changes in the frequency response between part 2a and 2b? Is the cut-off frequency the same? Can you explain any differences?

4. **[15] Laboratory Part 3 – Challenge Question 1**

Go back to Part 1 and try swapping the order of the two filters. Does the filter still work properly? If so, is the frequency response similar to your previous recorded data?

5. **[25] Laboratory Part 3 – Challenge Question 2**

Try changing the values of  $k$  in each of the modules. Divide  $k$  by 2 in the first filter module. Do you notice any distortion (overflow) in the output? If not, repeat it for the second filter. Can you explain why the distortion occurs at the physical peak of the output sine wave and only at certain frequencies?

6. **[20] Overall System Review**

*Looking at the laboratory exercise, explain how `fdatool` can both help and hinder filter design? Overall, what are the design consequences of a 6<sup>th</sup> order filter instead of a 3<sup>rd</sup> order filter?*