# AOE 3034 First Exam Review Guide

# LaPlace Transforms

- Definition
- Properties including linearity, connections between transform of a function and of its derivative
- Transform-pairs for impulse, step, damped sine and cosine
- Partial fraction expansion for rational transforms

#### **Mechanical Systems**

- units and dimensions
- Newton's Laws, Free-Body-Diagrams
- Ideal Hooke's Law spring; equivalent spring for parallel and serial systems
- Ideal damper; equivalent damper for parallel and serial systems
- Simple rotating systems

## **Elementary Vibrations**

- canonical spring-mass,  $\omega = \sqrt{(K/m)}$
- circular frequency, period, cycles-per-second (Hz)
- response to static load (shift of origin)
- unforced response of damped systems

## **Electrical Systems**

- units and dimensions
- Kirchoff's Laws: charge can not accumulate at a node; net voltage drop around a loop is zero
- Ideal resistors, capacitors and inductors
- Modeling of simple circuits