

# Level-3 ENGI3391 Control System Modelling Assignments 2017/18

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## 1. Formative Assignment (1 or 2 sessions) – Problem Sheet 2

**Note: This formative assignment must be approved by one of the demonstrators.**

Use Matlab to work out the solutions of Problem Sheet 2 (DUO- Level 3 Control and Signal Processing (17/18) - Teaching Materials – Control Lectures – Topic 3 Root Locus – Problem Sheet 2).

## Summative assignment – Controller Design

**Note: This is a summative assignment that will carry the full marks for the Control System Modelling element of the module. This assignment takes the form of a technical report and should be developed individually.**

A control system is useful for regulating the behaviour of industrial systems. Suppose an industrial system has the following transfer function (open-loop):

$$G(s) = \frac{s + 1}{s(s^2 + 4s + 5)}$$

As an Engineer, you will use Matlab and/or Simulink to design two controllers meeting specifications listed below.

Controller 1:

- Overshoot less than 5%
- Rise time less than 1 seconds
- Settling time of 2% error less than 4 seconds.

Controller 2:

- Overshoot less than 20%
- Rise time less than 0.5 seconds
- Steady-state error less than 5%.

The assignment report should be well structured and concisely written, containing:

- Summary of the key findings
- Outline of the design problems under study: current performance against its desired performance;
- Methodologies of your design, e.g., the compensator design or PID tuning;
- Discussion of the difference between these two controller designs, such as the design principle and controller performance;
- Description of broader challenges of controller design through this practice;
- References cited properly;
- Relevant calculations, designs or simulation results in the appendices.

The report should be no longer than **4 A4 pages** excluding the appendices, and the number of words should be no more than **3,500 words**. It is recommended to use either Arial or Helvetica font styles. The font size should be larger than **9 pt**.

The completed report (in PDF format) should be uploaded to DUO before **2pm on 5<sup>th</sup> March 2018**.