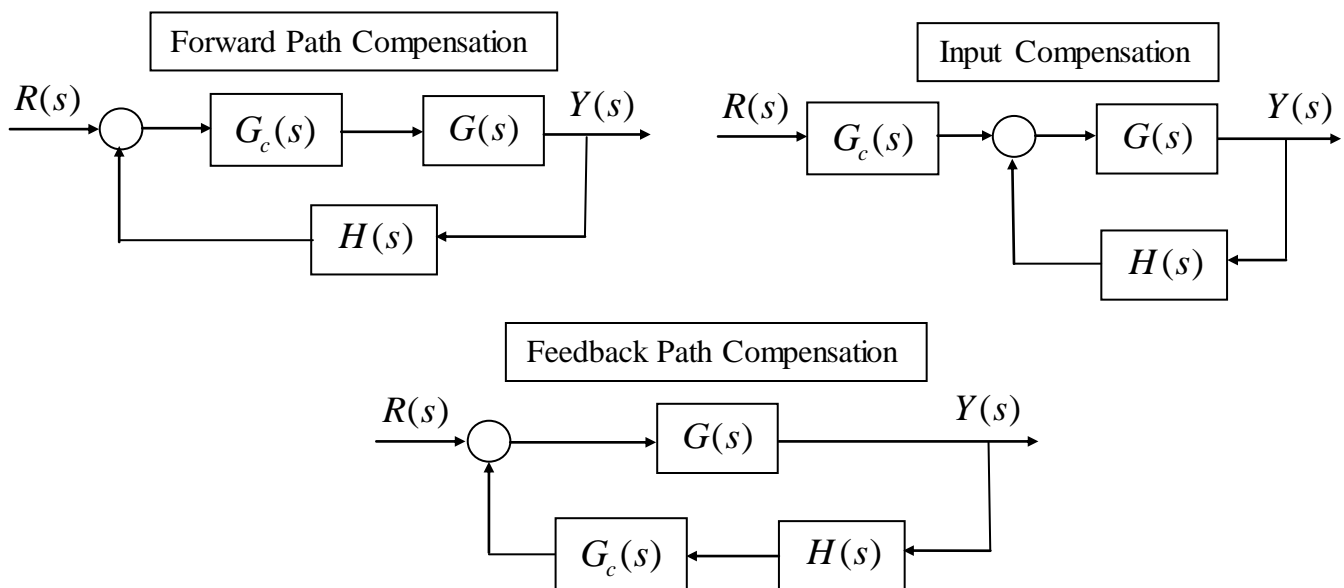


## ME 4710 Motion and Control

### Introduction to Compensator Design

- The control system design problem involves *two basic steps*. First, we must decide *what components* should be added to the system and in *what locations*.
- Generally, controller components can be *added to the forward path, feedback path, or input path* of the feedback loop as illustrated in the following diagrams. Combinations of these positions can also be considered.
- Having chosen the location of the controller components in the control loop, the problem is to design the components so they *compensate* for poor performance characteristics of the original system.
- Obviously, the *more components* a system has, the *more expensive* it will be.



- This course will focus on compensators in the *input and forward paths* of the system.
- Our goal will be to design the control components to meet closed-loop specifications relating to *settling time, percent overshoot, steady-state error, bandwidth, stability* and *disturbance rejection*.
- The addition of control components *changes the root locus and Bode diagrams* of the system. It is our job to design the control components to provide beneficial changes to these diagrams, and consequently, provide acceptable performance.
- Keep in mind that, in practice, the plant (or process) must also be changed to meet performance specifications. Compensators can only do so much to improve the performance of the system with poorly chosen components. Ideally, all components within the control loop should be designed or chosen to work together.