Signals and Systems Learning Objectives
Unified Engineering
Spring 2004

Learning Objectives:

Students graduating from 16.030/040 will be able to:

1. **Demonstrate** an understanding of the fundamental properties of linear systems, by **explaining** the properties to others.
2. **Use** linear systems tools, especially transform analysis and convolution, to **analyze** and **predict** the behavior of linear systems
3. **Gain an appreciation for** the importance of linear systems analysis in aerospace systems.

Measurable outcomes (assessment method):

Students graduating from 16.030/040 will be able to:

1. **Explain** the importance of superposition in the analysis of linear systems. (concept test, homework, quiz)
2. **Explain** the role of convolution in the analysis of linear time invariant systems, and use convolution to **determine** the response of linear systems to arbitrary inputs. (concept test, homework, quiz)
3. **List** and **apply** properties of the unilateral and bilateral Laplace transforms. (concept test, homework, quiz)
4. **Use** Laplace transforms to **solve** differential equations, and to **determine** the response of linear systems to known inputs. (homework, quiz)
5. **Demonstrate** an understanding of the relationship between the stability and causality of systems and the region of convergence of their Laplace transforms, by **correctly explaining** the relationship, and using the relationship to **determine** the stability and causality of systems. (concept test, homework, quiz)
6. **Demonstrate** an understanding of the relation among the transfer function, convolution, and the impulse response, by **explaining** the relationship, and using the relationship to **solve** forced response problems. (concept test, homework, quiz)
7. **Explain** the relationship between a signal's bandwidth and its duration, and use that relationship to **predict and explain** the bandwidth requirements for aerospace applications such as Loran navigation, amplitude modulation, etc. (homework, quiz)
8. **Explain** the fundamentals of modulation, including amplitude modulation, frequency modulation, and sampling (impulse modulation), including the implications of the sampling theorem. (homework, quiz)