Signals and Systems

ELEC2100

Credits: 4

Pre-requisite: MATH2011 or MATH2023 or MATH2111 or MATH2350 or MATH2351 or MAT2352

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Course Description

This is a foundation course introducing signals and systems for modelling and analysis of a variety of engineering systems. The course covers continuous- and discrete-time Fourier analysis, Laplace Transform, interactions between signals and linear time invariant (LTI) systems, sampling theorem, differential and difference equations as LTI systems, and application examples in communications, control, and multimedia. MATLAB introduced as an integral part of this course.

Intended Learning Outcomes (ILOs)

On successful completion of this course, students will be able to :

CO1 - Describe Basic Continuous Time and Discrete Time signals and different ways to make use of and manipulate them.

CO2 - List the Properties of LTI systems and to determine the output of an LTI system using the impulse response and the convolution sum/integral, and the frequency response and transform.

CO3 - Correctly apply the appropriate transform (FS, DTFS, FT, DTFT) to produce a Frequency domain representation for continuous-time/discrete-time and periodic/aperiodic signals, and relate basic operations in the time and frequency domains.

CO4 - State and prove the sampling theorem.

CO5 - Analyze differential and difference equations as causal LTI systems and to realize them in different block diagram forms.

CO6 - Apply theories learnt to the analysis of communication systems including Amplitude Modulation and Frequency Division Multiplexing, the communication channel, mechanical systems, and new problems.

CO7 - Use the Software Tools Matlab to manipulate, process, analyze and plot signals.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve.

Assessments:

Homework	18%
Laboratory exercises	12%
Mid-term Examination	25%
Final Examination	45%

Course AI Policy

No AI tool should be used.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Required Texts and Materials

Reference book: Alan V. Oppenheim, Alan S. Wilsky and S.H. Nawab, Signals and Systems, Prentice-Hall Internal Editions, 2nd Edition

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The

University has zero tolerance of academic misconduct. Please refer to [Academic Integrity | HKUST – Academic Registry](#) for the University's definition of plagiarism and ways to avoid cheating and plagiarism.