成均館大學校
SUNG KYUN KWAN UNIVERSITY

College of Information and Communication Engineering

Course Information and Instruction

(Undergraduate EEE3011 Class)

1. Course Name	: **Digital Signal Processing**
2. Instructor	: Prof. Kim, Joong Kyu (Rm# 21225, 031-290-7122, jkkim@skku.edu)
3. Course Objective	: To learn theoretical fundamentals on digital signal processing and its applications as well as relevant programming skills.
4. Course Description	: Analysis and processing techniques used in digital signal processing. Sampling of continuous signals and interpolation of discrete signals. A/D and D/A conversion. Time series analysis of waveforms, z-transform, complex convolution theorem. Transform analysis of DLTI systems, introduction to FIR, IIR filters and FFT.
5. Prerequisite	: ***Signals and Systems and MATLAB***
6. Textbook	: **Discrete-Time Signal Processing** by Oppenheim and Schafer ***Signal Processing First*** *by McCellan, Schafer, and Yoder*
7. Reference	:(1**)** *Introduction to Signal Processing* by Orfanidis; Prentice Hall (2) *Introductory Digital Signal Processing* by Lynn and Fuerst; Wiley (3) *Analog and Digital Signal Processing* by Ambardar, PWS
8. Classnotes	:For your convenience, the classnote in PS and PDF forms will be distributed via the web-site http://dspl.skku.ac.kr/~course . Visit and download or print the classnote of each chapter!!!

9. Grade Policy:

Mid-term Exam	:30%
Final Exam	:40%
Attendance	:10%
Homeworks	:20%
----------------	---------
Total	:100%

Note: (1) All the exams are closed books, but you may bring one page of A4 size ***hand-written*** reference sheet to the examination. *(Illegal sheets will be confiscated at the place!!!)*
(2) Attendance will be checked every week during the semester..
(3) Homeworks(problem & programming) will be assigned several times during semester.
(4) Assignments as well as occasional announcements will be distributed via Internet web page.(http://dspl.skku.ac.kr/~course) or i-campus.
(5) No grade change will be allowed at the end of the semester.(e.g.: C or D to F etc.)

10. Topics & Schedule:

(1) Week # 1 : Introduction of digital signal processing: history of evolution, applications. Discrete-time signals: mathematical representation, category, typical basic signals, and comparison to continuous-time signals.

(2) Week # 2 : Discrete-time systems: definitions on memoryless, linear, causal, time-invariant, and stable systems. DLTI(discrete LTI) system and convolution sum: interpretation and properties.

(3) Week # 3 : Discrete systems represented by linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems: frequency response, and DTFT. Brief discussion of ideal digital filters.

(4) Week # 4 : Concept of singular sequences: definition and examples. Properties of DTFT and introduction to discrete random signals.

(5) Week # 5 : Z-transform: introduction, concept of region of convergence(ROC), typical examples, properties of ROC. Inverse z-transform: inspection, partial fraction expansion, power series expansion methods.

(6) Week # 6 : Z-transform properties with demonstrating examples. Inverse z-transform using contour integration.

----- Mid-term Examination -----

(7) Week # 7 : The complex convolution theorem, Parsevals's theorem, and the unilateral z-transform. Sampling of continuous signals: Nyquist sampling theorem.

(8) Week # 8 : Reconstruction(interpolation) of bandlimited signals: theoretical discussion, interpretation, and analysis in frequency domain. Discrete-time processing of continuous signals, impulse invariant systems, and continuous processing of discrete signals.

(9) Week # 9 : Changing the sampling rate using discrete-time processing: decimation(downsampling) and interpolation(upsampling).

(10) Week # 10 : Concept of anti-aliasing filter: definition, analysis, and applications. A/D conversion: analysis, quantization, and coding strategies.

(11) Week # 11: D/A conversion: analysis, concept of compensated reconstruction filter. Applications of decimation and interpolation to A/D and D/A.

(12) Week # 12: Transform analysis of DLTI systems: frequency response, phase distortion, the group delay, system function, and the inverse systems.

(13) Week # 13: Frequency response for rational system functions: theoretical discussion, and geometric interpretation of pole-zero diagrams.

(14) Week # 14: Structures for discrete-time systems: direct form I, direct formII(canonic direct form). Signal flow graph representation. Basic structures for IIR and FIR systems: direct forms, cascade forms, and parallel forms.

(15) Week # 15: Discussion of digital filter design techniques: FIR and IIR filters windowing techniques. Discrete Fourier transform(DFT) revisited, and introduction to the FFT algorithms.

(16) Week # 16 : ***----- Final Examination -----***

For more informations on this course please visit the homepage of the ***Digital Signal Processing Laboratory*** *at* ***http://dspl.skku.ac.kr*** *.*