

# デジタル信号処理

科目番号	情352
開設学部等	工学部 情報工学科
曜日時限	金曜日 3時限 E1-322
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履修年度	2011年前期
期間	前期
単位数	2
講義コード	60100300

## ■授業内容と方法

In this lecture, the discrete-time system and the frequency domain representation and its impulse response will be studied. Stability, causality, linear-shift invariance will be explained. Then, the Z-transform and the Digital filters, both FIR and IIR, will be studied and designed. The discrete Fourier transform (DFT) and its fast implementation algorithms (FFT) are another purpose of signal processing study in order to get knowledge of the spectral specification of a signal. There are many areas for DSP applications, to name some, digital image processing, medical image, remote sensing, seismology, speech processing, speech recognition, noise and echo canceling, image and speech coding for image phone and teleconference system, and many many other applications in fields of communications and control Engineering can be found to utilize DSP for a faster, reliable and cheaper implementation.

## ■達成目標

【専門性H2】 To understand the special technologies and terms related to Digital Signal Processing (DSP) such as analysis of the discrete-time signal & system. To get specialized in DSP technology and specialized in DSP theories such as: difference equation, flow graph, Discrete Fourier Transform, Z-transform etc.

【実践性F1】 To be able to design and evaluate DSP systems such as FIR & IIR digital filter. Also, to be able to follow DSP algorithm such as FFT. Then, practically implement a DSP algorithm in Matlab or other (Scilab etc.) software.

【創造性G3】 To be able to create a new algorithm in DSP for a special proposed circuit.

## ■評価基準と評価方法

Quiz 10%+  
 Practical Simulation Work & Home Work reports 30%+  
 Midterm 30%+  
 Last Exam. 30%

## ■履修条件

Discrete mathematics

## ■授業計画

第1回 (4/15)

●Introduction: Discrete System & Non-Discrete System, and Discrete Systems.

第2回 (4/22)

●Properties of the Discrete System: Linearity, Shift-Invariant System.

第3回 (4/29)

●Properties of the Discrete System: Stability, Causality.

第4回 (5/6)

Impulse Response.

第5回 (5/13)

●Processing of an Analog Signal Digitally

第6回 (5/20)

●Inverse System, Frequency Domain Representation of Discrete-Time Signal and System, Characteristic Function.

第7回 (5/27)

- Sampling Theory.  
第8回 (6/3)
- Mid -Term Examinations  
第9回 (6/10)
- Changing the Sampling Rate & Practical Consideration A/D-D/A.  
第10回 (6/17)
- Discrete Fourier Transform (DFT).  
第11回 (6/24)
- Computations of the DFT, Fast Fourier Transform (FFT) Algorithm.  
第12回 (7/1)
- The Z-Transform  
第13回 (7/8)
- Inverse Z-Transform, Theorems, Unilateral Z-Transform.  
第14回 (7/15)
- Digital Filter Structure  
第15回 (7/22)
- Digital Filters Design Techniques (FIR & IIR).  
第16回 (7/29)
- Last-Term Examination

## ■事前・事後学習

## ■教科書

ISBN

「例題で学ぶデジタル信号処理」金城、尾知 博	4339006785
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## ■参考書

ISBN

Discrete-Time Signal Processing by Alan V. Oppenheim & Ronald W. Schaffer Prentice-Hall 1989	9780131988422
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## ■備考(メッセージ)

ニュースグループ: `ura.ie.classes.dsp`

## ■オフィスアワー

Tuesday 3 : 0 0 ~ 5 : 0 0、 Friday 3 : 0 0 ~ 5 : 0 0

## ■メールアドレス

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## ■URL

`http://www.dsp.ie.u-ryukyu.ac.jp/~asharif/pukiwiki/index.php`