**KYUC/F/A/ASA/02**

**SCHOOL: PURE AND APPLIED SCIENCES**

**COURSE OUTLINE**

**DEPARTMENT:** PURE AND APPLIED SCIENCES

**PROGRAMME**: Bsc. (CSE)

**YEAR**: 4 **SEMESTER**: II

**UNIT CODE**:**EEE 2429 UNIT TITLE: DIGITAL SIGNAL PROCESSING**

**LECTURE HOURS:** 45 **PRE-REQUISITES:****EEE 2324: Signals and Communication 1**

**LECTURER**: Dr. Joseph M. Karanja

**LECTURER CONTACTS: EMAIL:** jmkaranja@kyu.ac.ke**TEL**: 0724366422

**Course Purpose**

To equip the learner with knowledge in discrete systems and Fourier transforms Z-transforms and the design of IIR and FIR filters.

**Expected Learning Outcomes**

By the end of this course, the learner should be able to:

1. Use Fourier and Z-transforms in the design of FIR and IIR filters
2. Design IIR and FIR filters

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1. **COURSE OUTLINE**

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| WEEK | TOPIC | SUB-TOPIC | REMARKS |
| 1-2 | Discrete-time signals and systems | Discrete–time sequences, Linear Time Invariant (LTI) systems, linearity, time invariance, causality, stability, unit-sample response. |  |
| 3-4 | Linear constant-coefficient difference equations; | Introduction to fourier transform.  Recursive and non-recursive Fourier Transform of discrete-time signals |  |
| 5 | CAT 1 |  |  |
| 5-7 | Fourier Transforms in signal processing | Properties of the Fourier Transforms,  Fourier Transforms of special sequences, and use of the Fourier Transform in signal processing, inverse Fourier Transform. Sampling of continuous-time signals The Discrete Fourier Transform |  |
| 8-9 | Discrete Fourier Transform (DFT) | Definition of the Discrete Fourier Transform (DFT), computing the DFT from the discrete-time sequence, properties of DFT, circular and linear convolution, Fast Fourier Transform (FFT), |  |
| 10 | CAT 2 |  |  |
| 11-12 | The z-Transform | Definition of the z-transform and the region of convergence, the z-transform theorems and properties. The inverse z-transform Digital Filters |  |
| 13-14 | Digital filter structures | Describe various structures of filters and their transformations. Infinite Impulse Response (IIR) filters, impulse invariance, bilinear transformation, frequency transformations, Finite Impulse Response (FIR) filters |  |
| 15-16 | Exams |  |  |

**Teaching Methodologies**

Lectures, group discussions, presentations, and laboratory work.

**Instructional Materials**

Computer Lab and Data projector

**Course Assessment**

The course shall be assessed using Assignments 5%, Continuous Assessment Tests 15%, and Practicals 10% and End of Semester Examinations 70%

Course Textbooks

1. Hayes M. H. (1999). Schaum's Outline of Theory and Problems of Digital Signal Processing, McGraw-Hill. ISBN: 0070273898, 9780070273894
2. Proakis J. G., & lngle V. K. (1997). Digital Signal Processing using Matlab V.4, International Thomson. ISBN: (0-534-947 10-7)
3. Steven, W. S. (2003). Digital Signal Processing: A Practical Guide for Engineers and Scientists, Newnes, ISBN: 075067444X, 9780750674447.

**Reference Textbooks**

1. Antoniou A. (2006). Digital Signal Processing Signals Systems and Filters, McGraw. ISBN: 0070636338
2. Ingle V. & Proakis J. (2011). Digital Signal Processing Using MATLAB, 3rd Ed., Cengage Learning, ISBN: 1111427372, 9781111427375
3. Lai E. (2003). Practical Digital Signal Processing for Engineers and Technicians, Newnes, 1st Ed. ISBN: 0080473849

**Course Journals**

1. International Journal of Digital Signal Processing ISSN 0974 – 9594
2. Digital Signal Processing: A Review Journal ISSN 10512004
3. Journal of Signal Processing Systems ISSN 1939-8115

**Reference Journals**

1. Journal of VLSI and Signal Processing (JVSP)ISSN- ISSN 2319-4200
2. The International Journal of Digital Signal and Image Processing (IJDSIP) ISSN 2347-4165.
3. Signal Processing: an international Journal ISSN 1985-2339
4. International Journal of Signal Processing, Image Processing and Pattern Recognition ISSN 2005-4254.