**Course Description Form**

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| 1. Course Name: DIGITAL SIGNAL PROCESSING
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| 1. Course Code:
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| 1. Semester / Year: Master MSc. Class
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| 1. Description Preparation Date:01-05-2024
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| 1. Available Attendance Forms: Weekly , Mandatory attendance
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| 1. Number of Credit Hours (Total) / Number of Units (Total): 3 Credit hour
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| 1. Course administrator's name (mention all, if more than one name)
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| Name: Yahiea M.H. Al NaiemyEmail: yahiea.alnaiemy@uodiyala.edu.iq |
| 1. Course Objectives
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| **Course Objectives** | Specific outcomes of instruction (The student will be able to): 1-Understand basic discrete-time systems, linearity, linear time-invariance, stability, impulse response, and discrete convolution. 2-Implement discrete time systems, recursive and non-recurse realizations. 3-Perform Z transform and finding the inverse Z transform including its properties. 4- Understand frequency analysis of both continuous and discrete signals. 5-Understand frequency response of linear time invariant (LTI) systems. 6-Understand discrete Fourier transform, its properties, and applications. 7-Design digital filters both FIR, IIR filters. 8-Understand of multi-rate signal processing. |
| 1. Teaching and Learning Strategies
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| **Strategy** | -Active lectures - Tutorials - presentation Exercises |
| 1. Course Structure
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| **Week**  | **Hours**  | **Required Learning Outcomes**  | **Unit or subject name**  | **Learning method**  | **Evaluation method**  |
|  1 | 2Hr | A,B,C,D | Introduction to discrete linear systems techniques, Arithmetic operation of Binary numbers including 1’s & 2’s complements | Lecturing , exercises, experiments | Exam |
|  2 | 2Hr | A,B,C,D | Discrete-Time Fourier Transform and Linear Time Invariant Systems | Lecturing | Exam |
|  3 | 2Hr | A,B,C,D | The Z transform | Lecturing | Exam |
| 4 | 2Hr | A,B,C,D | Properties of digital filters | Lecturing | Exam |
| 5 | 2Hr | A,B,C,D | Fourier transforms, sampling | Lecturing | Exam |
| 6 | 2Hr | A,B,C,D | Sampling continuous-time signals: the sampling theorem. | Lecturing | Exam |
| 7 | 2Hr | A,B,C,D | A/D conversion and quantization  | Lecturing | Exam |
| 8 | 2Hr | A,B,C,D | The Discrete Fourier Transform. | Lecturing | Exam |
| 9 | 2Hr | A,B,C,D | The Fast Fourier transform | Lecturing | Exam |
| 10 | 2Hr | A,B,C,D | Digital filter design | Lecturing | Exam |
| 11 | 2Hr | A,B,C,D | Finite impulse response (FIR) filters | Lecturing | Exam |
| 12 | 2Hr | A,B,C,D | Infinite impulse response (IIR) filters | Lecturing | Exam |
| 13 | 2Hr | A,B,C,D | Structures and properties of FIR and IIR filters and review | Lecturing | Exam |
| 14 | 2Hr | A,B,C,D | IIR - Direct, parallel and cascaded realizations | Lecturing | Exam |
| 15 | 2Hr | A,B,C,D | Coefficient quantization effects in digital filters | Lecturing | Exam |
| 1. Course Evaluation
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|  Exams Quizzes Presentations |
| 1. Learning and Teaching Resources
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| Required textbooks (curricular books, if any) | Discrete-Time Signal Processing by A. V. Oppenheim and R. W. Schafer, with M. T. Yoder and W. T. Padgett (PrenticeHall/Pearson, 2009, ISBN: 978-0131988422. |
| Main references (sources) | Digital Signal Processing: A Computer-Based Approach, S. K. Mitra, McGraw-Hill, |
| Recommended books and references (scientific journals, reports...) | Schaum's Outline of Digital Signal Processing, M. Hays, McGraw-Hill, 1999: This complements Mitra with lots of worked examples and summaries of each topic as well as a large number of additional problems. |
| Electronic References, Websites |  |