**COURSE SPECIFICATION**

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| This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the program specification. |

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| Baghdad University | 1. Teaching Institution |
| College of Engineering/Department of Electrical Engineering | 2. University Department/Centre |
| Engineering Analysis | 3. Course title/code |
| Electrical Engineering Undergraduate Program | 4. Programme(s) to which it contributes |
| Weekly | 5. Modes of Attendance offered |
| Yearly | 6. Semester/Year |
| 90 | 7. Number of hours tuition (total) |
| 2016-2017 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| The aim of this course is to provide the concepts and theory of signals and systems that are needed in | |
| almost all electrical engineering fields and in many other engineering and scientific disciplines as well. | |
| They form the foundation for further studies in areas such as communication, signal processing, and control | |
| Systems. | |

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| 10· Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Knowledge and Understanding   A1.Understanding lecture notes and solving the tutorial problems.  A2. Reading the academic reference texts and solving the problems at the end of each chapter.  A3. Demonstrating the applications of the theoretical subject in the field of communication and control. |
| B. Subject-specific skills  B1. Explain the relationships among the various representations of LTI systems—linear constant-coefficient difference or differential equation, frequency response, transfer function, and impulse response—and infer one representation from another (e.g., determine the impulse response from the difference equation, etc.). (In-class exercises, homework, quiz)  B 2. List and Classify systems based on their properties: in particular, understand and exploit the implications of linearity, time-invariance, causality, memory, and bounded-input, bounded-out (BIBO) stability. (In-class exercises, homework, quiz)  B 3. Explain the role of convolution in the analysis of linear time invariant systems, and use convolution to determine the response of linear systems to arbitrary inputs. (In-class exercises, homework, quiz)  B 4. Explain the need to define two new transforms—the Laplace and Z transforms—to treat a class of signals broader than what the Fourier transform can handle. (Homework, quiz)  B 5.Explain the various properties of the four Fourier transforms, the Laplace transform, and the Z transform—including time-shift, modulation (frequency shift), duality, symmetry and anti-symmetry—and exploit them to analyze and design signals and systems, etc. (homework, quiz).  B 6. Use Laplace transforms to solve differential equations, and to determine the response of linear systems to known inputs. (Homework, quiz)  B 7. Demonstrate an understanding of the relationship between the stability and causality of systems and the region of convergence of their Laplace transforms, by correctly explaining the relationship, and using the relationship to determine the stability and causality of systems. (In-class exercises, homework, quiz)  B 8. Demonstrate an understanding to determine Fourier transforms for continuous-time and discrete-time signals (or impulse-response functions), and understand how to interpret and plot Fourier transform magnitude and phase functions. (In-class exercises, homework, quiz) |
| Teaching and Learning Methods |
| Lecturing and Exercises |
| Assessment methods |
| Comprehensive exams, exams, assignments and seminars |
| C. Thinking Skills  C1. Reading some articles on signals and systems.  C2. Exploring the web sites related signals and systems.  C3. Establishing oral discussions. |
| Teaching and Learning Methods |
| Lecturing & Class discussions |
| Assessment methods |
| Exams that involve problem-solving skills and critical thinking skills |

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| D. General and Transferable Skills (other skills relevant to employability and personal development)  D1. Effective dealing with signals and systems.  D2. Establishing strong background for communication and control systems. |

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| 11. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| Exam | Lecturing, Discussions & Exercises | Continuous-time signals and discrete-time signals |  | 3 | 1 |
| Exam | Lecturing, Discussions & Exercises | Periodic signals, Unit Step and delta functions |  | 3 | 2 |
| Exam | Lecturing, Discussions & Exercises | Continuous-time systems and differential equations and impulse response |  | 3 | 3 |
| Exam | Lecturing, Discussions & Exercises | Discrete-time systems and differencel equations and impulse response |  | 3 | 4 |
| Exam | Lecturing, Discussions & Exercises | Convolution of continuous-time signals |  | 3 | 5 |
| xam | Lecturing, Discussions & Exercises | Properties of continuous-time and discrete-time systems: linearity, time-invariance, causality, memory, and bounded-input, bounded-out (BIBO) stability. |  | 3 | 6 |
| Exam | Lecturing, Discussions & Exercises | Trigonometric Fourier Series |  | 3 | 7 |
| Exam | Lecturing, Discussions & Exercises | Exponential Fourier Series |  | 3 | 8 |
| Exam | Lecturing, Discussions & Exercises | Fourier transform of basic signals |  | 3 | 9 |
| Exam | Lecturing, Discussions & Exercises | Properties of Fourier transform |  | 3 | 10 |
| Exam | Lecturing, Discussions & Exercises | Tutorial examples and problems on Fourier Transform |  | 3 | 11 |
| Exam | Lecturing, Discussions & Exercises | Unilateral Laplace transform of basic signals |  | 3 | 12 |
| Exam | Lecturing, Discussions & Exercises | Properties of unilateral Laplace transform |  | 3 | 13 |
| Exam | Lecturing, Discussions & Exercises | Tutorial examples and problems on unilateral Laplace transform |  | 3 | 14 |
|  |  | Review, discussion and exam |  | 3 | 15 |
| Exam | Lecturing, Discussions & Exercises | Invers unilateral Laplace transform |  | 3 | 16 |
| Exam | Lecturing, Discussions & Exercises | Tutorial examples and problems on inverse unilateral Laplace transform |  | 3 | 17 |
| Exam | Lecturing, Discussions & Exercises | Applications of Fourier transform |  | 3 | 18 |
| Exam | Lecturing, Discussions & Exercises | Applications of unilateral Laplace transform |  | 3 | 19 |
| Exam | Lecturing, Discussions & Exercises | Bilateral Laplace transform of basic signals |  | 3 | 20 |
| Exam | Lecturing, Discussions & Exercises | Properties of bilateral Laplace transform |  | 3 | 21 |
| Exam | Lecturing, Discussions & Exercises | Tutorial Examples and problems on bilateral Laplace transform |  | 3 | 22 |
| Exam | Lecturing, Discussions & Exercises | Convolution of discrete-time signals |  | 3 | 23 |
| Exam | Lecturing, Discussions & Exercises | Z- transform of Basic sequence |  | 3 | 24 |
| Exam | Lecturing, Discussions & Exercises | Properties of Z- transform |  | 3 | 25 |
| Exam | Lecturing, Discussions & Exercises | Inverse Z- transform |  | 3 | 26 |
| Exam | Lecturing, Discussions & Exercises | Tutorial Examples and problems on Z- transform |  | 3 | 27 |
| Exam | Lecturing, Discussions & Exercises | Applications of Z- transform |  | 3 | 28 |
|  |  | Final Exam |  | 3 | 29 |

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| 12. Infrastructure | |
| 1. Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, **Signals and Systems**, Prentice Hall, 2005.  2. Hwei P. Hsu, **Theory and Problems of** **Signals and Systems**, Schaum’s series,2005. | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER |
| Internet links related to the topics discussed in the book and class | Special requirements (include for example workshops, periodicals, IT software, websites) |
| None | Community-based facilities  (include for example, guest  Lectures , internship , field studies) |

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| 13. Admissions | |
| [Baccalauréat](http://www.google.iq/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CCUQFjAB&url=http%3A%2F%2Fen.wikipedia.org%2Fwiki%2FBaccalaur%25C3%25A9at&ei=ThAyVZW-HKO_sQSq7YCIAQ&usg=AFQjCNFmm1JYir6lQUYv4239RA9Oy4ymsg&sig2=56BQfecvGtYWO2F8thakpA&bvm=bv.91071109,d.cWc) / Scientific Branch | Pre-requisites |
| 20 | Minimum number of students |
| 35 | Maximum number of students |