**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 programme specification. |

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| University of Baghdad | 1. Teaching Institution |
| Electronics and communication | 2. University Department/Centre |
| Information theory and coding | 3. Course title/code |
|  | 4. Programme(s) to which it contributes |
|  | 5. Modes of Attendance offered |
| Year | 6. Semester/Year |
| Two per week | 7. Number of hours tuition (total) |
| 1/3/2016 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| The objective of this course is to discuss fundamental concepts and limits in information theory. It starts with basic concepts of information theory such as information content, entropy and continues to discuss Shannon’s theorem to illustrate the role of coding for efficient and reliable communication to give methods to construct good codes. | |

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| 10· Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Knowledge and Understanding   A1. Compute information content and entropy of different sources.  A2. Compute channel Capacity of various channels.  A3. Design source codes.  A4. Design error correcting and detecting codes.  A5.  A6 . |
| B. Subject-specific skills  B1. Knowledge of basic information theory probabilistic reasoning  B2.  B3. |
| Teaching and Learning Methods |
| 1- Lectures.  2- Tutorials.  3- Homework and Assignments. |
| Assessment methods |
| 1- Tests and Exams.  2- In-Class Questions and Discussions. |
| C. Thinking Skills  C1. Modeling  C2. Problem solving  C3. General analysis assimilation  C4. |
| Teaching and Learning Methods |
| Class discussion and in lecture review questions |
| Assessment methods |
| |  | | --- | | D. General and Transferable Skills (other skills relevant to employability and personal development)  D1.  D2.  D3.  D4. | |

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| 11. Course Structure | | | | | | | |
| Assessment Method | Teaching  Method | | | Unit/Module or Topic Title | ILOs | Hours | Week |
| Quiz/Exam | Lectures | | Mathematical model of information source and Information axioms | |  | 2 | 1 |
| Quiz/Exam | Lectures | | Discrete and continuous source | |  | 2 | 2 |
| Quiz/Exam | Lectures | | Source entropy and entropy rate | |  | 2 | 3 |
| Quiz/Exam | Lectures | | Mutual information | |  | 2 | 4 |
| Quiz/Exam | Lectures | | Joint and conditional entropies | |  | 2 | 5 |
| Quiz/Exam | Lectures | | Channel capacity of symmetric discrete channels | |  | 2 | 6 |
| Quiz/Exam | Lectures | | Channel capacity of non-symmetric discrete channels | |  | 2 | 7 |
| Quiz/Exam | Lectures | | Channel capacity and redundancy | |  | 2 | 8 |
| Quiz/Exam | Lectures | | Shannon theorem | |  | 2 | 9 |
| Quiz/Exam | Lectures | | Source coding; fixed and variable length codes | |  | 2 | 10 |
| Quiz/Exam | Lectures | | Shannon-Fano code | |  | 2 | 11 |
| Quiz/Exam | Lectures | | Huffman code | |  | 2 | 12 |
| Quiz/Exam | Lectures | | M-ary Huffman codes | |  | 2 | 13 |
| Quiz/Exam | Lectures | | Channel coding aims and application | |  | 2 | 14 |
| Quiz/Exam | Lectures | | Error detecting codes error correcting codes | |  | 2 | 15 |
| Quiz/Exam | Lectures | | Term exam | |  | 2 | 16 |
| Quiz/Exam | Lectures | | Linear block codes | |  | 2 | 17 |
| Quiz/Exam | Lectures | | Hamming codes | |  | 2 | 18 |
| Quiz/Exam | Lectures | | Polynomial algebra | |  | 2 | 19 |
| Quiz/Exam | Lectures | | Generator and parity check polynomials | |  | 2 | 20 |
| Quiz/Exam | Lectures | Cyclic codes | | |  | 2 | 21 |
| Quiz/Exam | Lectures | Systematic cyclic codes | | |  | 2 | 22 |
| Quiz/Exam | Lectures | Cyclic encoder | | |  | 2 | 23 |
| Quiz/Exam | Lectures | Syndrome decoder | | |  | 2 | 24 |
| Quiz/Exam | Lectures | Convolutional codes | | |  | 2 | 25 |
| Quiz/Exam | Lectures | States and Trellis diagrams | | |  | 2 | 26 |
| Quiz/Exam | Lectures | Transfer function | | |  | 2 | 27 |
| Quiz/Exam | Lectures | Code tree of convolutional encoder | | |  | 2 | 28 |
| Quiz/Exam | Lectures | Viterbi decoding | | |  | 2 | 29 |
| Quiz/Exam | Lectures | Sequential decoding | | |  | 2 | 30 |
| Quiz/Exam | Lectures | Application of convolutional codes | | |  | 2 | 31 |
| Quiz/Exam | Lectures | Term exam | | |  | 2 | 32 |

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| 12. Infrastructure | |
| Modern digital and analog communication systems by Lathi  Digital communication by Sklar | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER |
|  | Special requirements (include for example workshops, periodicals, IT software, websites) |
|  | Community-based facilities  (include for example, guest  Lectures , internship , field studies) |

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| 13. Admissions | |
|  | Pre-requisites |
| 10 | Minimum number of students |
| 32 | Maximum number of students |