Republic of Iraq

Ministry of Higher Education & Scientific Research Supervision and Scientific Evaluation Directorate Quality Assurance and Academic Accreditation

International Accreditation Dept.

Academic Program Specification Form For The

Academic 2020-2021

University: University of Baghdad

College : College of Engineering

Number Of Departments In The College :

Date of Form Completion : 30/10/2020

Dean ’s Name

Date : / /

Signature

Dean ’s Assistant For

Scientific Affairs

Date : / / Signature

The College Quality Assurance

And University Performance

Manager Date : / / Signature

Quality Assurance And University Performance Manager

Date : / / Signature

**TEMPLATE FOR PROGRAMME SPECIFICATION**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**ROGRAMME SPECIFICATION**

This Programme Specification provides a concise summary of the main features of the programme 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 is supported by a specification for each course that contributes to the programme.

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| 1. Teaching Institution | University of Baghdad - College of Engineering |
| 2. University Department/Centre | Department of Computer Engineering |
| 3. Programme Title | Bachelor of Computer Engineering |
| 4. Title of Final Award | B. Sc. in Computer Engineering |
| 5. Modes of Attendance offered | The annual system and the presence of students on campus and full-fledged under the method (today's program) face to face or e-learning.  The academic year runs from 30 weeks. You must complete 159 credit hours to succeed all courses (100-150 minutes) of lectures per week and (120) minutes. |
| 6. Accreditation | IAC-Iraqi Accreditation Council |
| 7. Other external influences | N/A |
| 8. Date of production/revision of  this specification | 30/10/2020 |
| **9. Aims of the Programme**  1- Graduating computer engineers to work in industry, academia and other sectors of computer engineering applications.  2- Providing the graduates the ability to continue their professional development through lifetime education.  3- Graduating engineers as leaders in profession and innovation.  4- Graduating engineers with understanding of the impact of their profession on society and the importance of ethics in profession.  **10. Learning Outcomes, Teaching, Learning and Assessment Methods.**  After reviewing the ABET standards and program objectives, it has been decided by the Ministry  of Higher Education and Scientific Research that the ABET standards (A - K) include the spirit  of our educational vision. Therefore, it was approved.   1. **Cognitive goals**   A1- The ability to apply knowledge of mathematics, science and engineering to describe and solve problems.  A2- The ability to design and conduct experiments, as well as to analyze and interpret data.  A3- The ability to design a system, component, or process to meet desired needs. | |

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| 1. **The skills goals special to the programme**   B1- Developing initial competence in computer engineering majors  B2- Identifying, formulating and solving computer engineering problems using modern engineering tools, techniques, and skills  B3- Performing integrated design of computer systems, components or processes by means of practical experiences. |
| **Teaching and Learning Methods**  1- Lectures.  2- Educational programs.  3- Duties and tasks.  4- Lab. Experiments  5- Tests and examinations.  6- Questions and discussions.  7- A connection between theory and practice.  8- Field trips.  9- Extracurricular activities.  10- Seminars.  11- Panel discussions and oral conversations.  12- Reports, presentations and posters |
| **Assessment methods**  1- Study the conditions of former graduates.  2- Relevant committees in management such as scientific, QA.  3- The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.  4- A study by employers will be given to graduates at least every year to determine whether their work directions are relevant to their specialization  5- It will be re-evaluated every time for several years by faculty members and then the ministry, and talks will be offered with the graduates. |
| 1. **Affective and value goals**   C1- Obtaining an appreciation of some ethical problems that arise in the practice of the profession.  C2- Obtaining an understanding of the impact of their profession on society. |
| **Teaching and Learning Methods** |
| 1. Tests, quizzes. 2. Activities. 3. Participate during lectures |
| **Assessment methods** |
| **1**- Study the conditions of former graduates.  2- Relevant committees in management such as scientific, QA.  3- The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.  4- A study by employers will be given to graduates at least every year to determine whether their work directions are relevant to their specialization  5- It will be re-evaluated every time for several years by faculty members and then the ministry, and talks will be offered with the graduates. |

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| 1. **General and Transferable Skills (other skills relevant to employability and personal development)**   D1 - Developing written and verbal communication skills  D2 - The ability to work within multi-disciplinary teams | | | | | |
| **Teaching and Learning Methods** | | | | | |
| 1. Tests, quizzes. 2. Activities. 3. Participate during lectures | | | | | |
| **Assessment Methods** | | | | | |
| 1- Study the conditions of graduates innocently.  2 - The relevant line from the Internet communication circuit, QA.  3- For example, workplace and job title every year.  4- Study of business trends  5- At each year stage, faculty members and the district will be re-evaluated, and conversations with alumni will be presented. | | | | | |
| **11. Programme Structure** | | | | | **12. Awards and Credits** |
| Level/Year | Course or  Module  Code | Course or Module  Title | Credit rating | |
| Th. | Pr. |
| **First** | **GS 101** | Human rights | **2** | **-** | Bachelor Degree  Requires ( x ) credits |
| **GE 102** | Mathematics | **4** | **-** |
| **COE 103** | Electronic I | **3** | **2** |  |
| **COE 104** | Electrical circuits | **3** | **2** |
| **COE 105** | Fundamentals of Digital Systems | **3** | **2** |
| **COE 106** | Computer programing Methodology | **3** | **2** |
| **COE107** | Fundamentals of Computer System | **3** | **2** |  |
| **GS 108** | English | **2** | **-** |  |
|  | | | | | |
| Second | **GS 201** | Arabic | **2** | **-** |  |
| **COE 202** | Engineering Mathematics | **4** | **-** |  |
| **COE 203** | Electronic II | **3** | **2** |  |
| **COE 204** | Microprocessor and Microcomputer I | **3** | **2** |  |
| **COE 205** | Digital System Design | **3** | **2** |  |
| **COE 206** | Data Structure and Algorithms | **2** | **2** |  |
| **COE 207** | Communications | **3** | **2** |  |
| **GS 208** | English | **2** | **-** |  |
|  | | | | | |
| Third | **COE 301** | Computer Architecture I | **3** | **-** |  |
| **COE 302** | Digital Control Systems | **3** | **2** |  |
| **COE 303** | Microprocessor and Microcomputer II | **3** | **2** |  |
| **COE 304** | Operating Systems | **3** | **-** |  |
| **COE 305** | Computer Network | **3** | **2** |  |
| **COE 306** | Digital Signal Processing | **2** | **-** |  |
| **COE 307** | Data Base Systems | **2** | **2** |  |
| **GS 308** | English | **2** | **-** |  |
| Fourth | **COE 401** | Internet Technology | **3** | **2** |  |
| **COE 402** | Computer Architecture II | **3** | **-** |  |
| **COE 403** | Embedded System | **3** | **2** |  |
| **COE 404** | Computer Security | **3** | **-** |  |
| **COE 405** | Robotics and Artificial Intelligence | **3** | **-** |  |
| **COE 406** | Computer Vision and pattern Recognition | **3** | **-** |  |
| **COE 407** | Engineering Project | **2** | **2** |  |
| **GS 408** | English | **2** | **-** |  |

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| 13. Personal Development Planning |
| Continuous improvement is a student focus and every day is a natural part of our profession.  We always strive to improve the processes that increase the degree of achievement of the department and college goals, and a periodic study is conducted to study the sites of weakness or deficiency in order to overcome or overcome them. We ask each teacher to work on continuous improvement of students' performance and write down the problems and obstacles facing students or the educational process within his specialization in his workplace in an effort to ensure quality and we practice continuous improvement to provide our optimal program and the following specific procedures have been successfully implemented:  1- Comprehensive changes in the curriculum for the 2019-2020 academic year  2- Continuous improvement of faculty members through training programs.  3- Enhancing the number of faculty members for the higher scientific classes.  4- Purchasing a number of laboratory equipment and measuring instruments.  5- Purchasing a number of books for the department's library.  6- Purchasing a number of computers.  7-Establishing a network of access facilities provided by the College of Wireless Engineering network (LAN) with stations now available in the department.  8- Employment of a number of faculty members and engineering staff.  9- An increase in extra-curricular activities for students, such as holding conferences and scientific seminars.  10- Reconstructing and rehabilitating classrooms and rooms in the department, as well as services and infrastructure. |
| 14. Admission criteria. |
| Admission to the Bachelor’s program in the Department of Central and Ministerial Computer Engineering and Computers in the following world:  1- The applicant or what follows from the Iraqi high school diploma. Students must obtain a high average to qualify for admission to colleges of engineering.  2- The Ministry of Education and Higher Education.  3- The distribution of students to the 13 engineering departments of the College of Engineering at the University of Baghdad, including the Department of Computer Engineering, and a winding of the ability plan and average evaluation of applicants and their aspiration or selection. The capacity plan of the Department of Computer Engineering in the last triennium was 40-50 students.  4- The number of students accepted for admission is available in centers in the names of the state and ministries.  5 - Specific time.  6- An applicant who graduated from the secondary school system outside Iraq has completed twelve twelve years of combined elementary and secondary schools and studies from a recognized school. An equivalent certificate from the Iraqi Ministry of Education is also required.  Admission to the Department of Computer Engineering is a high capacity. As shown in the classification ranks, in the Iranian Army Edition. |
| 15. Key sources of information about the programme |
| **A**- The department page on the college’s website.  B- Computer Engineering Department Handbook.  C- College of Engineering Handbook.  D- Some committee meetings of the Ministry for the Computer Engineering Department. |

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| **Curriculum Skills Map** | | | | | | | | | | | | | | | | | | | |
| **please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed** | | | | | | | | | | | | | | | | | | | |
|  | | | | **Programme Learning Outcomes** | | | | | | | | | | | | | | | |
| Year / Level | Course  Code | Course  Title | Core (C)  Or  Optional (O**)** | Knowledge and understanding | | | | Subject-specific skills | | | | Thinking Skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | |
| **A1** | **A2** | **A3** |  | **B1** | **B2** | **B3** |  | **C1** | **C2** |  |  | **D1** | **D2** |  |  |
| First | **GS 101** | Human rights | C |  |  |  |  |  |  |  |  | **√** |  |  |  | **√** |  |  |  |
| **GE 102** | Mathematics | C | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **COE 103** | Electronic I | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  |  |  |  |  |  | **√** |  |  |
| **COE 104** | Electrical circuits | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  |  |  |  |  |  | **√** |  |  |
| **COE 105** | Fundamentals of Digital Systems | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  |  |  |  |  |  | **√** |  |  |
| **COE 106** | Computer programing Methodology | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE107** | Fundamentals of Computer System | C | **√** |  | **√** |  | **√** |  |  |  |  |  |  |  |  | **√** |  |  |
| **GS 108** | English | C |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
| Second | **GS 201** | Arabic | C |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
| **COE 202** | Engineering Mathematics | C | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **COE 203** | Electronic II | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 204** | Microprocessor and Microcomputer I | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 205** | Digital System Design | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 206** | Data Structure and Algorithms | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 207** | Communications | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **GS 208** | English | C |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
| Third | **COE 301** | Computer Architecture I | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 302** | Digital Control Systems | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 303** | Microprocessor and Microcomputer II | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 304** | Operating Systems | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 305** | Computer Network | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 306** | Digital Signal Processing | O | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 307** | Data Base Systems | O | **√** | **√** | **√** |  | **√** | **√** | **√** |  |  |  |  |  |  | **√** |  |  |
| **GS 308** | English | C |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
| Fourth | **COE 401** | Internet Technology | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 402** | Computer Architecture II | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 403** | Embedded System | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  | **√** |  |  |
| **COE 404** | Computer Security | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 405** | Robotics and Artificial Intelligence | O | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 406** | Computer Vision and pattern Recognition | O | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  |  |  |  |  |
| **COE 407** | Engineering Project | C | **√** | **√** | **√** |  | **√** | **√** | **√** |  | **√** | **√** |  |  | **√** | **√** |  |  |
| **GS 408** | English | C |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |

**First Stage**

**TEMPLATE FOR COURSE SPECIFICATION**

**MATHEMATICS I**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department  (COED) |
| 3. Course title/code | Mathematics I / GE102 |
| 4. Modes of Attendance offered | Semester System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The Semester year is composed of 15-week regular subjects. |
| 5. Semester/Year | 1st and 2nd Academic Semesters  2020 – 2021 |
| 6. Number of hours tuition (total) | 60 hrs. / 3 theory + 1 discussion / 6 units |
| 7. Date of production/revision of this  specification | November / 2020 |
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| 8. Aims of the Course | |
| A1. The general goal of education as a whole is to prepare the student for public and private life to benefit his community and himself. Upgrading the student’s level in mathematics in particular and in the educational process in general. | |
| A2. Developing the student's ability to conclude, generalize, and use their own logic. | |
| A3. Student understands of some mathematical concepts, such as: relationship -function - trigonometric functions - differentiation - integration - prob. | |
| A4. Understanding mathematical proof and its rationale. Understanding some mathematical systems such as: clique-matrices. Recognize mathematics and learn about its most important applications in life. | |
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| 9. Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals. |
| A1. Solution of linear algebraic equations  A2. Matrix operations and inverse of a matrix  A3. Complex variables  A4. Differential calculus  A5. Integral calculus |
| 1. The skills goals special to the course |
| A student who successfully fulfills the course requirements will have demonstrated:  B1. Learn to use concepts of engineering mathematics.  B2. Apply these concepts in their studies to solve the engineering problems related to the main topics studied in mechanical engineering.  B3. Learn methods for sketch functions.  B4. Learn and recruit Logarithmic and Trigonometric functions in the related mathematics models.  B5. Be able to apply differential equations in engineering problems and applications.  B6. Work in groups and function on multi-disciplinary teams.  B7. Understand professional, social and ethical responsibilities.  B8. Communicate effectively. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Field Trips. 8. Extracurricular Activities. 9. In- and Out-Class oral conservations. |
| Assessment methods |
| 1. Lab  2. Quizzes and exams  3. homework  4. assignments |
| C. Affective and value goals |
| C1. Ability to analyze.  C2. Ability to solve problems.  C3. Ability to calculate the results. |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions |
| Assessment methods |
| 1. Quizzes and exams  2. homework  3. Lab  4. assignments |
| D. General and rehabilitative transferred skills (other skills relevant to employability and personal development) |
| D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts.  D4. Self-discipline and self-motivation. |
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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or  Topic Title | Teaching  Method | Assessment  Method |
| 1 | 4 | Items A1,A2.A4 | Complex Number | C1,C2,C3 | Weekly Quizzes |
| 2 | 4 | Items A1,A2.A4 | Determinates  Matrix, properties, operations | C1,C2,C3 |  |
| 3 | 4 | Items A1,A2.A4 | Review of functions  Limits, continuity, derivatives | C1,C2,C3 |  |
| 4 | 4 | Items A1,A2.A4 | Transcendental functions  Inverse functions, Trigonometric functions | C1,C2,C3 |  |
| 5 and 6 | 8 | Items A1,A2.A3.A4 | Inverse Trigonometric functions | C1,C2,C3 |  |
| 7 | 4 | Items A1,A2.A3.A4 | Indeterminate forms and L’Hopital’s R | C1,C2,C3 |  |
| 8 | 4 | Items A1,A2.A3.A4 | Differentiation, differentiation rules | C1,C2,C3 |  |
| 9 | 2 | Items A1,A2.A3.A4 | Derivatives of trigonometric functions | C1,C2,C3 |  |
| 10 | 2 | Items A1,A2.A3.A4 | Derivatives of the inverse trigonometric functions | C1,C2,C3 |  |
| 11 | 4 | Items A1,A2.A3.A4 | Natural logarithms | C1,C2,C3 |  |
| 12 | 4 | Items A1,A2.A3.A4 | The exponential function | C1,C2,C3 |  |
| 13 and 14 | 8 | Items A1,A2.A3.A4 | Hyperbolic functions and their inverse | C1,C2,C3 |  |
| 15, 16, and 17 | 12 | Items A1,A2.A3.A4 | Integration-the definite integral | C1,C2,C3 |  |
| 18 and 19 | 8 | Items A1,A2.A3.A4 | Indefinite integrals | C1,C2,C3 |  |
| 20 and 21 | 8 | Items A1,A2.A3.A4 | Substitution and Area between curves | C1,C2,C3 |  |
| 22, 23, and 24 | 12 | Items A1,A2.A3.A4 | Techniques of integration, basic integration formulas, integration by parts, integration of rational functions by partial fractions, trigonometric substitutions, integral Tables | C1,C2,C3 |  |
| 25 and 26 | 8 | Items A1,A2.A3.A4 | Applications of definite integrals- Volumes by Slicing and Rotation about Axis | C1,C2,C3 |  |
| 27, 28, 29, and 30 | 16 | Items A1,A2.A3.A4 | Differential Equations  First order differential equations, variable separable, homogeneous, linear, exact first order, special first order equations (Bernoulli’s differential equations, non-exact differential equation). | C1,C2,C3 |  |

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| 11. Infrastructure | |
| 1. Books Required reading: | * “Thomas Calculus” G. Thomas, M. Weir, et al., 11th edition, 2004. * “Calculus II”; by Paul Dawkins, 2007. * “Engineering Mathematics”, by John Bird, 5th edition, Elsevier Ltd., 2007. * “Engineering Mathematics”, by K.A. Stroud, First edition, MACMILLAN and CO LTD, 1970. * “Theory and Problems of Advanced Calculus”, by Robert Wrede and Murray R. Spiegel, Second Edition, McGRAW-HILL, 2002. |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | * Howard, A. et. Al. (2008). Calculus. McGraw-Hill Papers. * Faddeev, L. D., and P. N. Pyatov. "The differential calculus on quantum linear groups." Fifty Years of Mathematical Physics: Selected Works of Ludwig Faddeev. 2016. 510-522.‏ * Kalton, Nigel, and Lutz Weis. "The $ H^{\infty} $-Functional Calculus and Square Function Estimates." arXiv preprint arXiv:1411.0472 (2014).‏ * Abadi, Martín, Bruno Blanchet, and Cédric Fournet. "The Applied Pi Calculus: Mobile Values, New Names, and Secure Communication." Journal of the ACM (JACM) 65.1 (2017). |
| B-Electronic references, Internet  sites… |  |

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| 12. The development of the curriculum plan |
| Maintaining Continuous development of academic curricula in line with the scientific development. |

**TEMPLATE FOR COURSE SPECIFICATION**

**ELECTRONICS I**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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.

|  |  |
| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department  (COED) |
| 3. Course title/code | Electronics I/ COE 103 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st and 2nd Academic Semesters  2020 – 2021 |
| 6. Number of hours tuition (total) | 60 hrs. /2 hrs. Per week Theory and 60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  specification | November/2020 |
|  | |
| 8. Aims of the Course | |
| A1. How to use the learned skills to understand, derive, and solve the equations in various objects (e.g. Electrical circuits II, Engineering Analysis, Electronics II, Communications, etc.) | |
| A2. Representation of an introduction to the following course (Electronics II). | |
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| 9. Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals. |
| A1. Design simple circuits that depend on diode characteristics.  A2. Solve problems related to diode circuit.  A3. Solve the problem related to transistor circuit.  A4. Design simple circuits that depend on transistor characteristics. |
| 1. The skills goals special to the course. |
| B1. Acquire good knowledge in the atomic structure and crystalline structures.  B2. The differences between the insulators, conductors, and semiconductors.  B3. Recognizing the properties and differences between n and p material and the formation of them.  B4. The principle of operation of the diode, the IV characteristics and the equivalent models of the diode.  B5. A good knowledge of different diode applications.  B6. The principle of BJT transistor construction, operation principle and transistor analysis for different configurations.  B7. The dc biasing and operating point of the different configurations of BJT transistors.  B8. A basic understanding of the BJT transistor as a switch. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Lab. Experiments. 5. Tests and Exams. 6. In-Class Questions and Discussions. 7. Connection between Theory and Application. 8. Field Trips. 9. Extracurricular Activities. 10. Seminars. 11. In- and Out-Class oral conservations. |
| Assessment methods |
| 1. Lab  2. Quizzes and exams  3. homework  4. assignments |
| 1. Affective and value goals |
| C1. Ability to analyze.  C2. Ability to solve problems.  C3. Ability to calculate the results. |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions |
| Assessment methods |
| 1. Quizzes and exams  2. homework  3. Lab  4. assignments |
| D. General and rehabilitative transferred skills (other skills relevant to employability and personal development) |
| D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts.  D4. Self-discipline and self-motivation. |
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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or  Topic Title | Teaching  Method | Assessment  Method |
| 1 | 2 the.  1 tut. | Item A1 | Atom structures | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 2 | 2 the.  1 tut. | item A2 | Energy bands, insulators, conductors | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 3 | 2 the.  1 tut. | item A3 | Semi-conductor | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 4 | 2 the.  1 tut. | item A3 | Type of semi-conductor | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 5 | 2 the.  1 tut. | item A4 | PN-junction | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 6 | 2 the.  1 tut. | item A4 | Forward and reserved biased | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 7 | 2 the.  1 tut. | item A4 | Diode characteristics | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 8 | 2 the.  1 tut. | item A4 | Diode equation | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 9 | 2 the.  1 tut | item A4 | Diode equivalent circuit | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 10 | 2 the.  1 tut. | item A5 | Diode applications: switching | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 11 | 2 the.  1 tut. | item A5 | Rectifier circuits | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 12 | 2 the.  1 tut. | item A5 | Clipping circuit | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 13 | 2 the.  1 tut. | item A5 | Clipping circuit | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 14 | 2 the.  1 tut. | item A5 | Clamping circuit | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 15 | 2 the.  1 tut. | item A5 | Clamping circuit | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 16 | 2 the.  1 tut. | item A5 | Regulators | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 17 | 2 the.  1 tut. | item A5 | Zener diode | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 18 | 2 the.  1 tut. | item A5 | Logic circuits | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 19 | 2 the.  1 tut. | item A5 | Special type diodes | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 20 | 2 the.  1 tut. | item A6 | Bipolar transistor | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 21 | 2 the.  1 tut. | item A6 | Configuration, operation | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 22 | 2 the.  1 tut. | item A6 | C.B configuration | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 23 | 2 the.  1 tut. | item A6 | C.E configuration | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 24 | 2 the.  1 tut. | Item A6 | C.C configuration | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 25 | 2 the.  1 tut. | item A7 | D.C biasing | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 26 | 2 the.  1 tut. | item A7 | Biasing Circuits | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 27 | 2 the.  1 tut. | item A7 | Biasing Circuits (continued) | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 28 | 2 the.  1 tut. | item A7 | Load line analysis | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 29 | 2 the.  1 tut. | item A7 | BJT Design | From 1 to12 of  T-Methods | From 1 to 4 of  A-Methods |
| 30 | 2 the.  1 tut. | item A7 | Transistor switching networks |  |  |

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| 11. Infrastructure | |
| 1. Books Required reading: | * "Electronic Devices and Circuit Theory", Robert Boylestad, Louis Nashelsky, 10th Edition , 2009. * “Semiconductor Physics and Devices” , Donald A. Neamen, 3rd edition, 2003” * "Microelectronic Circuits", Sedra, Smith, Fourth edition or Fifth edition, Oxford University Press, 1998-2003. |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | none |
| B-Electronic references, Internet  sites… | none |

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| 12. The development of the curriculum plan |
| Maintaining Continuous development of academic curricula in line with the scientific development. |

**TEMPLATE FOR COURSE SPECIFICATION**

**ELECTRICAL CIRCUITS I**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad | |
| 2. University Department/Centre | Computer Engineering Department  (COED) | |
| 3. Course title/code | Electrical Circuits I / COE 104 | |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The Annual System is composed of 30-week regular subjects. The laboratory is an annual system, the first course, DC circuits due to health conditions and the Covid-19 pandemic. We will accredit an electronic laboratory during the month, with students attending one week of the laboratory, to familiarize students with the laboratory and equipment and teach them to use and connect components and measuring devices in the correct and accurate manner. The second course is the alternating current laboratory with the same system for the first course. The theoretical course is reinforced in the laboratory. The Annual System is composed of 30-week regular subjects. | |
| 5. Semester/Year | 1st and 2nd Academic Semesters  2020 – 2021 | |
| 6. Number of hours tuition (total) | 150 hrs. / 5 hrs., per week  90 hrs. /3 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. | |
| 7. Date of production/revision of this  specification | November/ 2020 | |
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| 8. Aims of the Course | | |
| A1. Explain and analyze the voltage/current relationships and operational characteristics of resistors, inductors, capacitors, and voltage and current sources. | |
| A2. Explain and analyze different electrical circuit morphologies. In particular; series and parallel circuit structures, equivalent circuit configurations arrived at by the combination of series and parallel circuit elements such as resistors, inductors, capacitors, current and voltage sources, equivalent circuit configurations arrived at using network theorems such as; Thevenin and Norton equivalent circuits, superposition, and source transformations. | | |
| A3. Explain and analyze power and energy dissipation and distribution for DC & AC circuits composed of the elements listed in the first objective. | | |
| A4. Design simple electrical circuits, with DC & AC sources, that satisfy specific functional requirements. | | |
| A5. Explain and analyze the voltage/current relationships and operational characteristics of resistors, inductors, capacitors, and voltage and current sources. | | |
| A6. Explain and analyze different electrical circuit morphologies. In particular; series and parallel circuit structures, equivalent circuit configurations arrived at by the combination of series and parallel circuit elements such as resistors, inductors, capacitors, current and voltage sources, equivalent circuit configurations arrived at using | | |
| A7. Explain and analyze power and energy dissipation and distribution for AC circuits composed of the elements listed in the first objective. | | |
| A8. Design simple electrical circuits, with AC sources, that satisfy specific functional requirements. | | |
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| 9. Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals. |
| A1. Electricity and Magnetism  A2. Solution of linear algebraic equations  A3. Matrix operations and inverse of a matrix  A4. Complex variables  A5. Differential calculus  A6. Integral calculus |
| 1. The skills goals special to the course. |
| A student who successfully fulfills the course requirements will have demonstrated:  B1. An ability to define and explain the meaning/function of charge, current, voltage, power, energy, R, L, C, the op-amp, and the fundamental principles of Ohm's law, KVL and KCL including an understanding of electrical safety and the effect of current on humans.  B2. An ability to write the equilibrium equations for a given network and solve them analytically, for the steady state (DC and AC/phasor) solution.  B3. An ability to state and apply the principles of superposition, linearity, source transformations, and Thevenin/Norton equivalent circuits to simplify the analysis of circuits and/or the computation of responses.  B4. An in depth understanding of the behavior of inductances and capacitances, and differentiating  A5. An ability to qualitatively and quantitatively predict and compute the steady state AC responses of basic circuits using the phasor method.  B6. An ability to compute effective and average values of periodic signals and compute the instantaneous and average powers delivered to a circuit element.  B7. An ability to compute the complex power associated with a circuit element and design a circuit to improve the power factor in an AC circuit.  B8. An ability to determine the conditions for maximum power transfer to any circuit element.  B9. Principles of 3-phase circuits. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Lab. Experiments. 5. Tests and Exams. 6. In-Class Questions and Discussions. 7. Connection between Theory and Application. 8. Field Trips. 9. Extracurricular Activities. 10. Seminars. 11. In- and Out-Class oral conservations. 12. Reports, Presentations, and Posters. |
| Assessment methods |
| 1. Lab  2. Quizzes and exams  3. homework  4. assignments |
| 1. Affective and value goals |
| C1. Ability to analyze.  C2. Ability to solve problems.  C3. Ability to calculate the results. |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions |
| Assessment methods |
| 1. Quizzes and exams  2. homework  3. Lab  4. assignments |
| D. General and rehabilitative transferred skills (other skills relevant to employability and personal development) |
| D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts.  D4. Self-discipline and self-motivation. |
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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or  Topic Title | Teaching  Method | Assessment  Method |
| 1 | 2 the.  1 tut.  2 exp. | items 1,2,3 of section 6 | Introduction and color coding , temperature effect | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 2 | 2 the.  1 tut.  2 exp. | items 1,2,3 of section 6 | Introduction and color coding , temperature effect | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 3 | 2 the.  1 tut.  2 exp. | items 1,2,3 of section 6 | Sources and source transformation | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 4 | 2 the.  1 tut.  2 exp. | items 1,2,3 of section 6 | Ohm's law, equivalent resistance | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 5 | 2 the.  1 tut.  2 exp. | items 1,2,3 of section 6 | Ohm's law, equivalent resistance | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 6 | 2 the.  1 tut.  2 exp. | items 1,2,3 of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 7 | 2 the.  1 tut.  2 exp. | items 1,2,3,4of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 8 | 2 the.  1 tut.  2 exp. | items 1,2,3,4of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 9 | 2 the.  1 tut.  2 exp. | items 1,2,3,4,5 of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 10 | 2 the.  1 tut.  2 exp. | items 1,2,3,4,5 of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 11 | 2 the.  1 tut.  2 exp. | items 1,2,3,4,5,6 of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 12 | 2 the.  1 tut.  2 exp. | items 1,2,3,4,5,6of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of article 12 |
| 13 | 2 the.  1 tut.  2 exp. | items 1,2,3,4,5,6, of section 6 | DC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 14 | 2 the.  1 tut.  2 exp. | items 1,2,3,4,5,6of section 6 | Star Delta transformation | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 15 | 2 the.  1 tut.  2 exp. | items 1,2,3,4,5,6of section 6 | Power calculation | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 16 | 2 the.  1 tut.  2 exp. | Items7,8,9of section 15 | Introduction to AC signals | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 17 | 2 the.  1 tut.  2 exp. | Items7,8,9of section 15 | Average value and RMS value | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 18 | 2 the.  1 tut.  2 exp. | Items7,8,9of section 15 | Capacitor , Inductor , | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 19 | 2 the.  1 tut.  2 exp. | Items9,10,11,12of section 15 | AC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 20 | 2 the.  1 tut.  2 exp. | Items9,10,11,12of section 15 | AC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 21 | 2 the.  1 tut.  2 exp. | Items9,10,11,12of section 15 | AC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 22 | 2 the.  1 tut.  2 exp. | Items9,10,11,12of section 15 | AC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 23 | 2 the.  1 tut.  2 exp. | Items9,10,11,12of section 15 | AC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 24 | 2 the.  1 tut.  2 exp. | Items9,10,11,12of section 15 | AC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 25 | 2 the.  1 tut.  2 exp. | Items9,10,11,12of section 15 | AC circuit analysis methods | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 26 | 2 the.  1 tut.  2 exp. | items 13,14, of section 15 | Power Calculation | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 27 | 2 the.  1 tut.  2 exp. | items 13,14, of section 15 | Power Calculation | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 28 | 2 the.  1 tut.  2 exp. | items 13,14, of section 15 | Power triangle | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 29 | 2 the.  1 tut.  2 exp. | items 13,14, of section 15 | Power factor correction, Resonance | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 30 | 2 the.  1 tut.  2 exp. | item 15 of section 15 | Three phase circuits | From 1 to12 of section 11 | From 1 to 4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | * Electrical Circuits, 2nd edition, Nilson, 1986. * Fundamentals of Electric Circuits", C.K. Alexander and M.N.O. Sadiku, McGraw Hill, 4th edition, 2009.2. * "Basic Engineering Circuit Analysis", J. D. Irwin, Fourth edition, Macmillan, most recent edition**.** * Electrical Devices and Circuit theory, 9th edition , Boylestad, 2006. |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | * Electrical Circuit theory and Technology, 4th edition, Bird, 2010. * Engineering Circuit Analysis, 7th edition, Hayt and Kemmerly,2007. * Introductory Circuit Analysis, 5th edition, Bolyestad, * A Textbook of Electical Technology, Thiraja, 2009. * Introduction to Electric Circuits (9th Edition) by Dorf and Svoboda, John Wiley & Sons (2013). * ASEECircuitAnalysis\_in\_MATLAB\_and\_Simulink * Matlab - Electronics and Circuit Analysis using Matlab * The\_Analysis\_and\_Design\_of\_Linear, 8th edition (2016) * Mathematical\_Foundations\_for\_Linear (2016) |
| B-Electronic references, Internet  sites… | Laboratory experiments in the Measurements Lab of the department.  Available websites related to the subject.  Extracurricular activities. |

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| 12. The development of the curriculum plan |
| Maintaining Continuous development of academic curricula in line with the scientific development. |

**TEMPLATE FOR COURSE SPECIFICATION**

**FUNDAMENTALS OF DIGITAL SYSTEMS**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department  (COED) |
| 3. Course title/code | Fundamentals of Digital System / COE 105 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st and 2nd Academic Semesters  2020 – 2021 |
| 6. Number of hours tuition (total) | 90 hrs. /3 hrs. Per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  specification | November/2020 |
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| 8. Aims of the Course | |
| A1. Define the problem (Inputs and Outputs), write its functions. | |
| A2. Implement functions using digital circuit (Combinational or Sequential). | |
| A3. Minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh-Map or Tabulation Method). | |
| A4. Have knowledge in analyzing and designing procedures of Combinational and Sequential circuits. | |
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| 9. Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals. |
| A1. Number system  A2. Digital Codes  A3. Logic Gates  A4. Boolean algebra  A5. The Karnaugh Map  A6. Arithmetic circuits  A7. Sequential Circuits |
| 1. The skills goals special to the course |
| A student who successfully fulfills the course requirements will have demonstrated:  B1. Learning about the different number systems.  B2. Learning the arithmetic operations related to different number systems.  B3. Learning the different logic gates of computer system and their work.  B4. Ability to design, simplify and implement different logical and arithmetic circuits that considered the basic of digital system.  B5. Ability to design, simplify and implement different sequential circuits, counters and shift registers.  B6. Learning the basics of computer hardware including memory, registers, arithmetic and logic unit, and bus system. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Field Trips. 8. Extracurricular Activities. 9. In- and Out-Class oral conservations. |
| Assessment methods |
| 1. Lab  2. Quizzes and exams  3. homework  4. assignments |
| C. Affective and value goals |
| C1. Imagination  C2. Analyzing  C3. Ability to work within the team.  C4. Problem solving, by applying the learning outcomes and subject -specific skills to solve practical design problems. |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions |
| Assessment methods |
| 1. Quizzes and exams  2. homework  3. Lab  4. assignments |
| D. General and rehabilitative transferred skills (other skills relevant to employability and personal development) |
| D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts.  D4. Self-discipline and self-motivation. |
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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or  Topic Title | Teaching  Method | Assessment  Method |
| 1-2 | 2 theory  1 tutorial  2 labs. | A1 | Number system | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 3-4 | 2 theory  1 tutorial  2 labs. | A2, A6 | Arithmetic Operation | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 5 | 2 theory  1 tutorial  2 labs. | A1, A2 | Digital Codes | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 6 | 2 theory  1 tutorial  2 labs. | A3, A6 | Logic Gates | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 7-9 | 2 theory  1 tutorial  2 labs. | A4, A6 | Boolean algebra | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 10-11 | 2 theory  1 tutorial  2 labs. | A4 | The Karnaugh Map | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 12-13 | 2 theory  1 tutorial  2 labs. | A4 | Implementation of Logic Circuit | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 14-15 | 2 theory  1 tutorial  2 labs. | A2, A6 | Basic Adders | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 16-17 | 2 theory  1 tutorial  2 labs. | A2, A6 | Arithmetic circuits | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 18 | 2 theory  1 tutorial  2 labs. | A2, A6 | Comparators | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 19 | 2 theory  1 tutorial  2 labs. | A2, A6 | BCD Adder | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 20 | 2 theory  1 tutorial  2 labs. | A6 | Decoders and encoders, case studies: Seven Segment decoder, Memory Decoder, Priority Encoder | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 21 | 2 theory  1 tutorial  2 labs. | A6 | Multiplexers and De-multiplexers, case studies: Chanel Multiplexing and Demulutiplexing | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 22 | 2 theory  1 tutorial  2 labs. | A5 | Sequential Circuits | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 23-24 | 2 theory  1 tutorial  2 labs. | A5, A6 | Asynchronous Counter | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 25-27 | 2 theory  1 tutorial  2 labs. | A5, A6 | Synchronous Counter | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |
| 28-30 | 2 theory  1 tutorial  2 labs. | A5, A6 | Shift registers, linear feedback shift register | From 1 to9 of Teaching and Learning Methods | From 1 to3 of Assessment Method |

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| 11. Infrastructure | |
| 1. Books Required reading: | * Fundamentals of logic design, 5th edition, Roth, 2004, Thomson learning, Inc. * Digital electronics, 5th edition, Bignell, 2007, Thomson learning, Inc. * Digital logic design, 4th edition, Holdsworth, 2002, Elsevier. * Digital systems,10th edition, Tocci, 2007,pearson prentice hall * Digital fundamentals, 10th edition, Floyd, 2009, Pearson prentice hall. * Digital design, 4th edition, Mano, 2007, Pearson prentice hall. |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | None |
| B-Electronic references, Internet  sites… | Laboratory experiments in the (logic Lab.) of the department.  http://www.electronics-tutorials.ws/combination |

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| 12. The development of the curriculum plan |
| Maintaining Continuous development of academic curricula in line with the scientific development. |

**TEMPLATE FOR COURSE SPECIFICATION**

**COMPUTER PROGRAMMING METHODOLOGY**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department  (COED) |
| 3. Course title/code | Computer Programming Methodology / COE 106 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st and 2nd Academic Semesters  2020 – 2021 |
| 6. Number of hours tuition (total) | 150 hrs. / 5 hrs., per week |
| 7. Date of production/revision of this  specification | November/2020 |
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| 8. Aims of the Course | |
| A1. This course aims to help students to learn how to use Python programming language to solve real-life and scientific problems. The objective of the course is to provide students with confidence of their ability to write small useful programs. | |
| A2. In addition, the course covers some details of essential programming topics like: program debugging, testing and algorithm development. | |
| A3. Students learn best by experimenting a plenty of programs that that solve useful and interesting problems. The problems tackled cover a wide range of general, and scientific applications although none of them require specialist knowledge. | |
| A4. Students will test all their homework programs included some examples either on a computer in the class laboratory or on their personal computers under supervisions of our staff. | |
| A5. Quizzes are placed at the end of each section so both lecturer and students can check whether they are on the right track. | |
| A6. The programming exercises are also graded, allowing the students gradually to attempt more difficult problems as their confidence and experience increase. | |
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| 9. Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals. |
| A1. Computers and their uses/ Hardware/Software.  A2. Programming languages/How to use/ run programs.  A3. Design and representation of algorithms/ implementation / testing and verification/ program A4. Complex variables.  A5. Programming in Python/basic syntax: interactive mode programming and script mode programming.  A6. Handling multiple data types and type conversions.  A7. Python program control: Conditions, boolean logic, logical operators, ranges.  A8. Functions in Python.  A9. Python classes and OOP. |
| 1. The skills goals special to the course. |
| Upon successful completion of the course, students should be able to  B1. Read given source code in Python and understand its behavior  B2. Extend existing source code for new features  B3. Write original source code to solve an engineering problem  B4. Organize source code in a modular form.  B5. Design and implement dynamic data structures using user-defined data types.  B6. Read and write Python programs that use dynamic data structures.  B7. Read and write Python programs that use structures. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Lab. Experiments. 5. Tests and Exams. 6. In-Class Questions and Discussions. 7. Connection between Theory and Application. 8. Field Trips. 9. Extracurricular Activities. 10. Seminars. 11. In- and Out-Class oral conservations. 12. Reports, Presentations, and Posters. |
| Assessment methods |
| 1. Lab  2. Quizzes and exams  3. homework  4. assignments |
| 1. Affective and value goals |
| C1. Ability to analyze.  C2. Ability to program the idea.  C3. Ability to excute. |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions |
| Assessment methods |
| 1. Quizzes and exams  2. homework  3. Lab  4. assignments |
| D. General and rehabilitative transferred skills (other skills relevant to employability and personal development) |
| D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts.  D4. Self-discipline and self-motivation. |
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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or  Topic Title | Teaching  Method | Assessment  Method |
| 1 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Computers and their uses/ Hardware/Software | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 2 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Programming languages/How to use/ run programs | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 3 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Using computers in problem solving/ requirement specifications/ analysis | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 4 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Design and representation of algorithms/ implementation / testing and verification/ program | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 5 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Programming in Python/basic syntax: interactive mode programming and script mode programming | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 6 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python data types: variables, assignments and numerical types. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 7 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Arithmetic and logical operators, precedence of operators | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 8 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Numeric data type: using the Math library | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 9 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | String data type: simple string processing and string manipulation | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 10 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python text files: reading from and writing to a file | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 11 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python lists: Traversing a list and list operations | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 12 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python dictionary: accessing values in dictionary, updating dictionary and deleting dictionary elements | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 13 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Handling multiple data types and type conversions | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 14 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python modules: The import statement | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 15 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python date & time: the time module and the calendar module | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 16 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Simple graphics: “turtle” module; simple 2d drawing - colors, shapes. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 17 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python program control: Conditions, boolean logic, logical operators, ranges. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 18 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | If statement, nested if statement, if-else if ladder else | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 19 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Loops: while statement. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 20 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Loops: for statement | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 21 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Nested loops | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 22 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Skipping loop iterations break and continue. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 23 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Using loops for accessing data in lists, files… | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 24 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Functions in Python: new function creation, return values and calls | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 25 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Functions in Python: arguments and return values; formal vs actual arguments, named arguments. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 26 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Functions in Python: Recursive functions. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 27 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python classes and OOP: classes, objects, attributes and methods. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 28 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python classes and OOP: Inheritance, polymorphism and encapsulation. | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 29 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python classes and OOP: defining classes | From 1 to11 of section 11 | From 1 to 4 of section 12 |
| 30 | 3 the.  1 tut.  2 exp. | From 1 to 8 of section 10 | Python classes and OOP: extending classes | From 1 to11 of section 11 | From 1 to 4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | * Guttag, John. Introduction to Computation and Programming Using Python. Spring 2013 edition. MIT Press, 2013 * Allen B. Downey. Think Python. Second edition. O'Reilly, 2007. |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | * T. E. Oliphant, "Python for Scientific Computing," in Computing in Science & Engineering, vol. 9, no. 3, pp. 10-20, May-June 2007. * Atanas Radenski. 2006. "Python first": a lab-based digital introduction to computer science. SIGCSE Bull. 38, 3 (June 2006), 197-201. * Douglas Blank, Deepak Kumar, Lisa Meeden, and Holly Yanco. 2003. Pyro: A python-based versatile programming environment for teaching robotics. J. Educ. Resour. Comput. 3, 4, Article 1 (December 2003). |
| B-Electronic references, Internet  sites… | * Laboratory experiments in the (programming Lab) of the department. |

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| 12. The development of the curriculum plan |
| Maintaining Continuous development of academic curricula in line with the scientific development. |

**TEMPLATE FOR COURSE SPECIFICATION**

**FUNDAMENTALS OF COMPUTER SYSTEMS**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department  (COED) |
| 3. Course title/code | Fundamentals of Computer Systems / COE107 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st and 2nd Academic Semesters  2020 – 2021 |
| 6. Number of hours tuition (total) | 30 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  specification | Oct / 2020 |
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| 8. Aims of the Course | |
| A1. This course is intended for first class students. These students typically will have knowledge of how computer works, how to assemble a computer and how to troubleshoot hardware and software issues and also these students will be able to have a career in IT. | |
| A2. The students will enhance the capability of using Microsoft Word and Microsoft PowerPoint software because of the wide applications of these two software in the field of education, scientific research and the preparation of research reports. | |
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| 9. Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals. |
| A1. Introduction to Personal Computer.  A2. Describe a computer system.  A3. Fundamental Operating System (OS).  A4. Fundamental Laptops and Portable devices.  A5. Fundamental networks, explain the principle of networking. |
| 1. The skills goals special to the course. |
| The student will be able to:  B1. Define a computer system  B2. Identify the names, purposes, and characteristics of cases and power supplies  B3. Install and troubleshoot the case and power supply  B4. Identify the names, purposes, and characteristics of CPU  B5. Install and troubleshoot the CPU  B6. identify the names, purposes, and characteristics of motherboard  B7. Install and troubleshoot the motherboard  B8. Identify the names, purposes, and characteristics of memory  B9. Install and troubleshoot memory  B10. Identify the names, purposes, and characteristics of adapter cards  B11. Install and troubleshoot the adapter cards  B12. Identify the names, purposes, and characteristics of storage devices  B13. Install and troubleshoot the storage devices  B14. Identify the names, purposes, and characteristics of input devices and output devices  B15. Understand the purpose of an operating system  B16. Determine the appropriate operating system based on customer needs  B17. Install an operating system  B18. Navigate an operating system GUI  B19. Apply preventive maintenance techniques for operating systems  B20. Troubleshoot operating systems  B21. Identify the purpose and components of laptops and other portable devices  B22. Apply preventive maintenance techniques for laptops and portable devices  B23. Troubleshoot laptops and portable devices  B24. Understand the principles of networking, the basic networking concepts and technologies. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Lab. Experiments. 5. Tests and Exams. 6. In-Class Questions and Discussions. 7. Connection between Theory and Application. 8. Field Trips. 9. Extracurricular Activities. 10. Seminars. 11. In- and Out-Class oral conservations. 12. Reports, Presentations, and Posters. |
| Assessment methods |
| 1. Lab  2. Quizzes and exams  3. homework  4. assignments |
| 1. Affective and value goals |
| C1. Ability to install.  C2. Ability to troubleshoot.  C3. Ability to maintain. |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions |
| Assessment methods |
| 1. Quizzes and exams  2. homework  3. Lab  4. assignments |
| D. General and rehabilitative transferred skills (other skills relevant to employability and personal development) |
| D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts.  D4. Self-discipline and self-motivation. |

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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or  Topic Title | Teaching  Method | Assessment  Method |
| 1 | 2 exp. | Item 1 of section 10 | اساسيات الحاسوب  Computer Fundamentals | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 2 | 2 exp. | Items 2,3,4,5,6 of section 10 | مكونات الحاسوب  Computer Components | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 3 | 2 exp. | Items 7,8,9,10,11,12,13,14 of section 10 | مكونات الحاسوب  Computer Components (cont.) | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 4 | 2 exp. | Items 15,16 of section 10 | امان الحاسوب و ترخيص البرامج  Computer Safety and Software Licenses | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 5 | 2 exp. | Items 17,18 of section 10 | نظم التشغيل  Operating Systems | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 6 | 2 exp. | Items 19,20,21 of section 10 | نظم التشغيل  Operating Systems(cont.) | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 7 | 2 exp. | Item 22 of section 10 | مقدمة عن مايكروسوفت وورد 2010  Introduction to MS-Word 2010 | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 8 | 2 exp. | Item 23 of section 10 | ادراج الكائنات في مايكروسوفت وورد 2010  Insert objects in MS-Word 2010 | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 9 | 2 exp. | Item 24 of section 10 | ادراج الكائنات في مايكروسوفت وورد 2010  Insert objects in MS-Word 2010(cont.) | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 10 | 2 exp. | Item 25 of section 10 | مهام اضافية لمايكروسوفت وورد 2010  More options in MS-Word 2010 | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 11 | 2 exp. | Item 25 of section 10 | مهام اضافية لمايكروسوفت وورد 2010  More options in MS-Word 2010(cont.) | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 12 | 2 exp. | Item 26 of section 10 | مقدمة عن مايكروسوفت بوربوينت 2010  Introduction of Power Point 2010 | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 13 | 2 exp. | Item 27 of section 10 | مقدمة عن مايكروسوفت بوربوينت 2010  Introduction of Power Point 2010(cont.) | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 14 | 2 exp. | from 28 of section 10 | ادراج الكائنات و اضافة الحركات في مايكروسوفت بوربوينت 2010  Insert Objects and Add Animations in MS- Power Point 2010 | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 15 | 2 exp. | Item 29 of section 10 | ادراج الكائنات و اضافة الحركات في مايكروسوفت بوربوينت 2010  Insert Objects and Add Animations in MS- Power Point 2010(cont.) | From 1 to12 of section 11 | From 1 to 4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | * أ.م.د زياد محمد عبود, أ.د غسان حميد عبد المجيد, أ.م.د امير حسين مراد , م. بلال كمال احمد, "اساسيات الحاسوب و تطبيقاته المكتبية", الجزء الاول, الدار الجامعية للطباعة و النشر و التأليف و الترجمة , 2014. * أ.م.د زياد محمد عبود, أ.د غسان حميد عبد المجيد, م.د. مصطفى ضياء الحسني, "اساسيات الحاسوب و تطبيقاته المكتبية", الجزء الثاني, الدار الجامعية للطباعة و النشر و التأليف و الترجمة , 2016 |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | none |
| B-Electronic references, Internet  sites… | none |

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| 12. The development of the curriculum plan |
| Maintaining Continuous development of academic curricula in line with the scientific development. |

**Second Stage**

**TEMPLATE FOR COURSE SPECIFICATION**

**Engineering Mathematics**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW |

**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 programmed specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Computer Engineering Department (COED) | 2. University Department/Centre |
| Engineering Mathematics / COE 202 | 3. Course title/code |
| Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full-time students and on campus. They attend a full-day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 4. Modes of Attendance offered |
| 1st& 2nd / Academic Year 2020-2021 | 5. Semester/Year |
| 120 hrs. / 4 hrs. per week. | 6. Number of hours tuition (total) |
| November 2020 | 7. Date of production/revision of this specification |
| 8. Aims of the Course: | |
| 1. As a brief description for the Goals and objectives, by the completion of the course the goals are: 2. How to relate the skills and concepts learned from Mathematics to understand Engineering Mathematics 3. How to use the learned skills to understand, derive, and solve the equations in various objects (e.g., Electronics II, DSP, Communications, Digital Control etc.) 4. Representation of an Introduction to advanced calculus. | |
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| 9. Learning Outcomes, Teaching, Learning and Assessment Methods |
| A- Cognitive Goals  A1- Understanding the algebra of the Complex numbers and converting them to various forms.  A2- Applying useful topics of integration including numerical integration.  A3- Using Taylor polynomials to linearize functions and forming Taylor and Maclaurin series.  A4- Techniques for solving first order (linear or non-linear) differential equations, how to solve second and higher order (homogenous and non-homogenous) differential equations for determined and undetermined coefficients.\  A5- Using numerical methods to solve the ODE's using Euler and Runge-Kutta methods.  A6- Learning Laplace Transform and its applications in control systems.  A7- Acquiring Difference equations and Z-Transform to be used in DSP.  A8- Studying Fourier series and Transform to be used in Communications. |
| B- The skills goals special to the course  B1- How to relate the skills and concepts learned from Mathematic to understand Engineering Mathematics.  B2- How to use the learned skills to understand, derived, and solve the equations in various objects (e.g., Electronics II, DSP, Communications, Digital Control etc.)  B3- Representation of an introduction to advanced calculus. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. The connection between Theory and Application. 7. Seminars. 8. In-and Out-Class oral conservations. 9. Reports, Presentations, and Posters. |
| Assessment methods |
| 1. Examinations, Tests, and Quizzes. 2. Extracurricular Activities. 3. Student Engagement during Lectures. 4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor) |
| C- Affective and value goals  C1- An ability to read and comprehend mathematical literature at an appropriate level.  C2- An ability both to follow and correctly to construct mathematical proofs of appropriate degrees of complexity.  C3- An appreciation of the importance of proof, generalization, and abstraction in the logical development of formal theories. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams |
| Assessment methods |
| 1. Examinations, Tests, and Quizzes. 2. Extracurricular Activities. 3. Student Engagement during Lectures. 4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member ( Instructor ) |

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| D- General and Transferable Skills (other skills relevant to employability and personal development)  D1- Relying on online lectures using data show.  D2- Making the lecture more interactive by inclusion techniques. |

10- Course Structure:

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| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Complex Numbers, Operations, Polar and exponential form** | Item 1,2 of section 10 | 3 the.  1 tut. | 1 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Phasors and De Moivre Theorem. Quiz** | From 1 to 3 section 10 | 3 the.  1 tut. | 2 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Orthogonal Functions and Integrals, Integrations of continuous functions** | From 1 to 3 section 10 | 3 the.  1 tut. | 3 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Numerical Integration. Quiz** | From 1 to 3 section 10 | 3 the.  1 tut. | 4 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Taylor Polynomials and Linearization** | From 1 to 3 section 10 | 3 the.  1 tut. | 5 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Taylor 2nd and n-order polynomials, Remainder Term** | From 1 to 3 section 10 | 3 the.  1 tut. | 6 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Taylor and Maclaurin series, Quiz** | Item 4,5 of section 10 | 3 the.  1 tut. | 7 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **First-order ODE** | Item 7 of section 10 | 3 the.  1 tut. | 8 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Second-order ODE** | Item 7 of section 10 | 3 the.  1 tut. | 9 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **State-Space** | Item 7 of section 10 | 3 the.  1 tut. | 10 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Numerical Methods, Euler and Runge-Kutta** | Item 1 to 5& 7 of section 10 | 3 the.  1 tut. | 11 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Term Quiz** | Item 7 of section 10 | 3 the.  1 tut. | 12 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Laplace Transform Introduction and properties** | Item 7 of section 10 | 3 the.  1 tut. | 13 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Inverse Laplace Transform** | Item 6,7 of section 10 | 3 the.  1 tut. | 14 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Partial Fraction, Solving ODE using LT** | Item 5 of section 10 | 3 the.  1 tut. | 15 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Transfer Functions, Poles and Zeros, Quiz** | Item 5,6,8 of section 10 | 3 the.  1 tut. | 16 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Term Quiz** | Item 9 of section 10 | 3 the.  1 tut. | 17 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Difference Equations and Z-Transform** | Item 5,6,8 of section 10 | 3 the.  1 tut. | 18 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Design a digital controller, Numerical solution of DE** | Item 5,6,8 of section 10 | 3 the.  1 tut. | 19 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Partial Fraction, Solving ODE using LT** | Item 5,6,8 of section 10 | 3 the.  1 tut. | 20 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Transfer Functions, Poles and Zeros, Quiz** | Item 5,6,8 of section 10 | 3 the.  1 tut. | 21 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Z-Transform Introduction, properties** | Item 5,6,8 of section 10 | 3 the.  1 tut. | 22 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Sampling continuous signal, relation of ZT with LT** | Item 5,6 & 8 of section 10 | 3 the.  1 tut. | 23 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Inverse Z-Transform** | Item 6,8 of section 10 | 3 the.  1 tut. | 24 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Partial Fraction, Solving DE using ZT** | Item 6,8 of section 10 | 3 the.  1 tut. | 25 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Term Quiz** | Item 9 of section 10 | 3 the.  1 tut. | 26 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Fourier Series, trigonometric and complex forms** | Item 9 of section 10 | 3 the.  1 tut. | 27 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Fourier Transform** | Item 6 of section 10 | 3 the.  1 tut. | 28 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Discrete Fourier Transform** | Item 9 of section 10 | 3 the.  1 tut. | 29 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | **Term Quiz** | Item 9 of section 10 | 3 the.  1 tut. | 30 |

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| 11. Infrastructure | |
| 1. Books Required reading: | 1. Thomas Calculus, George B. Thomas, 11th Edition, 2005, Pearson Education Inc. 2. Thomas CALCULUS George B. Thomas Maurice D. Weir Global Edition 2010 |
| 1. Main references (sources) | 1. Croft et al., Engineering Mathematics A Foundation for Electronic, Electrical, Communications and Systems Engineering, 5th Ed., Pearson (2017). |
| 1. Recommended books and references (scientific journals, reports…) |  |
| 1. Electronic references, Internet sites… |  |

1. The development of the curriculum plan

Continuous developing academic curricula in line with the scientific development

**TEMPLATE FOR COURSE SPECIFICATION**

**Electronics II**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW |

**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 programmed specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Computer Engineering Department (COED) | 2. University Department/Centre |
| Electronics II / COE 203 | 3. Course title/code& Description |
| Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 4. Modes of Attendance offered |
| 1st& 2nd / Academic Year 2020-2021 | 5. Semester/Year |
| 90 hrs. / 3 hrs. per week . | 6. Number of hours tuition (total) |
| November 2020 | 7. Date of production/revision of this specification |
| 8. Aims of the Course | |
| 1. To understand the following:- 2. Small signal Amplifier analysis and Design using BJTs. 3. FET structure, Biasing, and small signal Amplifier analysis and Design using FET. 4. Ideal operational amplifiers applications (linear and non-linear). 5. Basic understanding to negative feedback. 6. Oscillators and multivibrators. 7. Logic families and their developments. 8. Analog to digital converters (ADC) and digital to analog converters (DAC). 9. Semiconductor memories. | |

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| 9·Learning Outcomes |
| A. Knowledge and Understanding:  A1. Small signal AC analysis of different configurations of BJT amplifiers.  A2. Field Effect Transistors basic structure, operation, and dc biasing.  A3. Small signal AC analysis of different configurations and types of FET amplifiers.  A4. Ideal Operational amplifiers equivalent circuit, characteristics, and applications.  A5. Basic understanding of negative feedback systems.  A6. Oscillators principles of operation and different oscillator circuits.  A7. 555 timers as multivibrators.  A8. Different logic families and their developments.  A9. DACs and ADCs.  A10. Semiconductor memories.  B. Subject-specific skills  B1. design simple electronic circuits.  B2. design amplification circuits according to the desired parameters.  C. Thinking Skills  C1. ability of optimal design.  C2. ability of electronic measurements  D. Personal Development  D1. Electronic device classification.  D2. H/W maintenance |
| Teaching and Learning Methods (T-methods) |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Lab. Experiments. 5. Tests and Exams. 6. In-Class Questions and Discussions. 7. Connection between Theory and Application. 8. Extracurricular Activities. 9. Seminars. 10. In- and Out-Class oral conservations. 11. Reports, Presentations, and Posters. |
| Assessment Methods (A-Methods)  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about  Curriculum and Faculty Member ( Instructor ) |

10.Course Structure

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| week | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the.  1 tut. | Item A1 | **The re model of BJT transistors (ac model of BJTs) and common emitter fixed bias configuration ac analysis** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 2 | 2 the.  1 tut. | Item A1 | **AC analysis of different BJT configurations** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 3 | 2 the.  1 tut. | Item A1 | **Effect of load and source resistance on the ac gain** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 4 | 2 the.  1 tut. | Item A1 | **Cascade configuration and design of BJT amplifiers.** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 5 | 2 the.  1 tut. | Item A2 | **Field Effect Transistors basic construction and operation** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 6 | 2 the.  1 tut. | Item A2 | **Transfer characteristics of different FET amplifiers** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 7 | 2 the.  1 tut. | Item A2 | **FET Biasing of different configurations** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 8 | 2 the.  1 tut. | Item A2 | **FET Biasing of different configurations (continued)** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 9 | 2 the.  1 tut. | Item A3 | **FET amplifiers ac analysis** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 10 | 2 the.  1 tut. | Item A3 | **FET amplifiers ac analysis(continued)** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 11 | 2 the.  1 tut. | Item A4 | **Operational amplifiers applications (linear applications)** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 12 | 2 the.  1 tut. | Item A4 | **Operational amplifiers applications (non-linear applications)** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 13 | 2 the.  1 tut. | Item A5 | **Negative feedback** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 14 | 2 the.  1 tut. | Item A6 | **Basic principles of oscillators** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 15 | 2 the.  1 tut. | Item A6 | **Different types of oscillators** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 16 | 2 the.  1 tut. | Item A7 | **Timing circuits 555 timer applications, 555 timer as a mono stable multivibrator** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 17 | 2 the.  1 tut. | Item A7 | **555 timer as an astable multivibrator and a bistable multivibrator** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 18 | 2 the.  1 tut. | Item A8 | **Logic Families (RTL, DTL)** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 19 | 2 the.  1 tut. | Item A8 | **TTL** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 20 | 2 the.  1 tut. | Item A8 | **ECL** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 21 | 2 the.  1 tut. | Item A8 | **CMOS** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 22 | 2 the.  1 tut. | Item A9 | **DAC** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 23 | 2 the.  1 tut. | Item A9 | **DAC** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 24 | 2 the.  1 tut. | Item A9 | **ADC** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 25 | 2 the.  1 tut. | Item A9 | **ADC** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 26 | 2 the.  1 tut. | Item A10 | **ROM** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 27 | 2 the.  1 tut. | Item A10 | **EPROM** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 28 | 2 the.  1 tut. | Item A10 | **E2PROM** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 29 | 2 the.  1 tut. | Item A10 | **Static RAM** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods) |
| 30 | 2 the.  1 tut. | Item A10 | **Dynamic RAM** | From 1 to 7 of (T-Methods) | From 1 to 4 of  (A-methods |

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| 11. Infrastructure | |
| 1. Books Required reading: | 1-"Electronic Devices and Circuit Theory", Robert Boylestad, Louis Nashelsky, 9th Edition , 2006.  Papers  2-Pa McAndrew, Colin C., Alexandra Lorenzo-Cassagnes, and Olin L. Hartin. "Transistor self-heating correction and thermal conductance extraction using only DC data." Microelectronic Test Structures (ICMTS), 2016 International Conference on. IEEE, 2016.‏ |
| 2. Main references (sources) | 3-Socratous, Josephine, et al. "Electronic Structure of Low‐Temperature Solution‐Processed Amorphous Metal Oxide Semiconductors for Thin‐Film Transistor Applications." Advanced functional materials 25.12 (2015): 1873-1885.‏  4-Gorniaczyk, Hannes, et al. "Single-photon transistor mediated by interstate Rydberg interactions." Physical review letters 113.5 (2014): 053601.‏ |
| A- Recommended books and references (scientific journals, reports…). | Laboratory experiments in the ( Electronics & Communications Lab ) of the department. |
| B-Electronic references, Internet sites… |  |

12. The development of the curriculum plan

Continuous improvement of curriculum and faculty members through training programs.

**TEMPLATE FOR COURSE SPECIFICATION**

**Microprocessor and Microcomputer I**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW |

**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 programmed specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Computer Engineering Department (COED) | 2. University Department/Centre |
| Microprocessor & Microcomputer I / COE 204 | 3. Course title/code& Description |
| Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 4. Modes of Attendance offered |
| 1st & 2nd / Academic Year 2020-2021 | 5. Semester/Year |
| 90 hrs. / 3 hrs. per week Theory .  60 hrs. / 2 hrs. per week Lab. | 6. Number of hours tuition (total) |
| November 2020 | 7. Date of production/revision of this specification |
| 8. Aims of the Course | |
| 1. What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)? 2. Knowledge of the software architecture of the 8088/8086 and how to write and run programs using assembly language. 3. Checking architecture of 80x86 microprocessor 4. Studying types of memories and communication principles between memory and the microprocessor. 5. Studying of peripheral devices and communication principles between peripheral devices and the microprocessor. 6. Studying Interrupts Interface. 7. Studying DMA Interface. | |

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| 9· Learning Outcomes, Teaching , Learning and Assessment Method |
| A- Cognitive goals:  A1- Describe the software architecture of the 8088/8086 microprocessor.  A2- Know about the microprocessor's registers which includes general purpose registers, special purpose registers, and segment registers.  A3- Explain how a byte or a word of data is stored at a memory address space and the meaning of aligned and misaligned word.  A4- Describe the meaning of a logical address, a physical address and how to use the segment register and the instruction pointer to generate the physical memory address.  A5- Describe the meaning of addressing modes which include the register operand addressing mode, the immediate operand addressing mode and the memory operand addressing mode.  A6- Write a program in an assembly language using the 8086-emulator software (compiling, debugging, and running the program) .  A7- Convert a program that is written in assembly language to machine codes.  A8- Use the instruction set of the 8088/8086 microprocessor that includes data transfer instructions, Arithmetic instructions, Logic instructions and Shift/Rotate instructions in writing a program.  A9- Change the state of the flag status bits by using the flag instructions.  A10- Describe the concept of a stack, when to use the stack and how a value inputs to the stack and return from it using the push and pop instruction.  A11- Write a procedure (function), call a procedure, and return to the main program.  A12- Describe the meaning of a string and how to handle the string using the string instructions.  A13- Write a macro (opcode) and describe the difference between a macro and a procedure.  A14- Describe the hardware architecture of the 8088/8086 microprocessor (pin layout).  A15- Explain how to configure the 8088/8086 microprocessor to work in minimum mode or maximum mode.  A16- Explain the bus system and identify the types of the bus system which includes the address bus , the data bus ,the control bus and how they work . |
| B. The skills goals special to the course  B1- Explain all the control signals that are needed in implementing the minimum mode interface between the 8088/8086 microprocessor and memory or input/output devices.  B2- Explain all the control signals that are needed in implementing the maximum mode interface between the 8088/8086 microprocessor and memory or input/output devices.  B3- Explain the 8284-clock generator and how it generates the system clock to the 8088/8086 microprocessor.  B4- Define the bus cycle and explain the meaning of memory read, memory write bus cycle and input/output read, input /output write bus cycle.  B5- Draw the read bus cycle and the write bus cycle for memory and input/output devices in both modes.  B6- Define the meaning of the wait state, the idle state and when or where the processor inserts it in the bus cycle system.  B7- Explain the interface between the 8088/8086 microprocessor and the 8288-bus controller to generate the control signals in maximum mode .  B8- Describe the hardware organization of the memory address space and explain the difference between the 8086/8088 microprocessor from this point.  B9- Describe the devices that are needed in implementing the memory interface with the 8088/8086 microprocessor.  B10- Explain why the needs for memory address decoding circuit.  B11- Define the memory types and how they interface with the 8088/8086 microprocessor.  B12- Define the input /output types and how they interface with the 8088/8086 microprocessor.  B13- Use the input/output instructions in transferring data between the microprocessor and the input/output devices.  B14- Explain the interrupt types and how to use the interrupt instruction in software program.  B15- Explain how to interface multiple interrupts using 74f148 encoder.  B16- Understand the concept of direct memory address ( DMA) and how the DMA controller works and interfaces with microcomputer system.  Teaching and Learning Methods.   1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Seminars. 8. In- and Out-Class oral conservations. 9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about  Curriculum and Faculty Member ( Instructor )  C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

10.Course Structure

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| week | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the.  2 exp. | Item 1 of section 10 | **Introduction to microprocessors& microcomputers.** | From 1 to 8 of section 11 | From 1 to 4 of section 12 |
| 2 | 2 the.  2 exp. | Item 2 of section 10 | **16-bit Microprocessor Software Architecture**  **(8088/8086 μp): BIU &EU.** | From 1 to 8 of section 11 | From 1 to 4 of section 12 |
| 3 | 2 the.  2 exp. | Item 3,4 of section 10 | **16-bit Microprocessor Software Architecture**  **(8088/8086 μp): memory organization, physical address generation & IO organization.** | From 1 to 8 of section 11 | From 1 to 4 of section 12 |
| 4 | 2 the.  2 exp. | Item 5,6 of section 10 | **Introduction to Assembly Language Programming& Addressing Modes I of the 8088/ 8086.** | From 1 to 8 of section 11 | From 1 to 4 of section 12 |
| 5 | 2 the.  2 exp. | Item 5,6 of section 10 | **Introduction to Assembly Language Programming& Addressing Modes II of the 8088/ 8086.** | From 1 to 8 of section 11 | From 1 to 4 of section 12 |
| 6 | 2 the.  2 exp. | Item A3 | **Converting Assembly Language Instructions to Machine Code.** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 7 | 2 the.  2 exp. | Item A3 | **Data Transfer instructions**  **[MOV, XCHG, LDS, LES, LEA].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 8 | 2 the.  2 exp. | Item A3 | **Arithmetic Instructions: Addition-[ADD, ADC, INC, AAA, DAA]**  **Subtraction-[SUB, SBB, DEC, NEG, AAS, DAS].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 9 | 2 the.  2 exp. | Item A3 | **Arithmetic Instructions: Multiplication-**  **[MUL, IMUL, AAM]**  **Division-[DIV, IDIV, AAD, CBW, CWD].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 10 | 2 the.  2 exp. | Item A3 | **Logic Instructions [AND, OR XOR, NOT, TEST].**  **Compare Inst. [CMP].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 11 | 2 the.  2 exp. | Item A3 | **Shift & Rotate Instructions [SHL, SAL, SHR, SAR, ROL, RCL, ROR, RCR].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 12 | 2 the.  2 exp. | Item A3 | **Flag Control Instructions [LAHF, SAHF, CLC, STC, CMC, CLI, STI, CLD, STD].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 13 | 2 the.  2 exp. | Item A3 | **Control Transfer Insts.**  **Unconditional jump [JMP].**  **Conditional Jump Insts.** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 14 | 2 the.  2 exp. | Item A3 | **LOOP&LOOP-Handling Instructions[LOOP, LOOPE/LOOPZ, LOOPNE/LOOPNZ].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 15 | 2 the.  2 exp. | Item A2, A3 | **The Stack & Subroutines [PUSH, PUSHF, POP, POPF, CALL, RET].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 16 | 2 the.  2 exp. | Item A3 | **String and String-Handling Instructions:** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 17 | 2 the.  2 exp. | Item A6 | **The 8088 and 8086 μps: [Pin layout, Minimum & Max- Mode Interfaces].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 18 | 2 the.  2 exp. | Item A7 | **System Clock, Bus Cycle & Time States.8088/8086 Fully Buffered.** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 19 | 2 the.  2 exp. | Item A8 | **The Memory System:[Memory bus-cycles read/ write, memory interfacing to 8088/8086 (I)].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 20 | 2 the.  2 exp. | Item A8 | **The Memory System:[Memory types, memory chip requirements].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 21 | 2 the.  2 exp. | Item Item A8 | **The Memory System:[Memory interfacing to 8088/8086 (II)].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 22 | 2 the.  2 exp. | Item A9 | **Input /Output Interface Circuits and Peripheral Devices [Isolated& Memory-mapped I/O, Input/Output Bus cycles].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 23 | 2 the.  2 exp. | Item A9 | **Input /Output Interface Circuits and Peripheral Devices-[LED, Switches, 7-segment].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 24 | 2 the.  2 exp. | Item A9 | **Input /Output Interface Circuits and Peripheral Devices- [Keyboard & Parallel Printer Interface].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 25 | 2 the.  2 exp. | Item A5 | **Introduction to 8279 Keyboard &Display controller and its interface to 8088/8086.** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 26 | 2 the.  2 exp. | Item A5 | **Interrupt-[interrupt types: hardware, software, internal; vector table].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 27 | 2 the.  2 exp. | Item A5 | **Interrupt-[external hardware interrupt interface using INTR &NMI].** | From 1 to 8 of  T-methods | From 1 to 4 of  A-methods |
| 28 | 2 the.  2 exp. | Item A5 | **Interrupt-[Multiple Interrupt Interface using 74F148 encoder].** | From 1 to 12 of  T-methods | From 1 to 4 of  A-methods |
| 29 | 2 the.  2 exp. | Item A10 | **Introduction to Direct Memory Accessing DMA & 8237 DMA controller I.** | From 1 to 12 of  T-methods | From 1 to 4 of  A-methods |
| 30 | 2 the.  2 exp. | Item A10 | **Introduction to DMA & 8237 DMA controller II.** | From 1 to 12 of  T-methods | From 1 to 4 of  A-methods |

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| 11. Infrastructure | |
| 1. Books Required reading: | The 8088 and 8086 Microprocessors: Programming Interfacing, Software, Hardware, and Applications by [Walter A. Triebel](http://search.barnesandnoble.com/booksearch/results.asp?ATH=Walter+A%2E+Triebel), [Avtar Singh](http://search.barnesandnoble.com/booksearch/results.asp?ATH=Avtar+Singh)  The Intel Microprocessors, 8086/8088, 80186/80188, 80286, Pentium. Bybarrayb,brey. |
| 2. Main references (sources) | Introduction to 80x86 Assembly Language and Computer Architecture by [Richard Detmer](http://www.amazon.com/s/ref=ntt_athr_dp_sr_1?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=Richard%20Detmer).  Paper  5-Shekhar Borkar, Andrew A. Chien, "The future of microprocessors", Communications of the ACM CACM Homepage archive, ACM New York, NY, USA, Volume 54 Issue 5, Pages 67-77, 2011 |
| A- Recommended books and references (scientific journals, reports…). | 6-N. Firasta et al., " Intel ® AVX: New frontiers in performance improvements and energy efficiency ", Intel Corporation Tech. Rep., May 2008.  7-B. Radunovic V. Milutinovic, "A survey of reconfigurable computing architectures", International Workshop on Field Programmable Logic and Applications, Field-Programmable Logic and |
| B-Electronic references, Internet sites… |  |

12. The development of the curriculum plan

Continuous improvement of curriculum and faculty members through training programs.

**TEMPLATE FOR COURSE SPECIFICATION**

**Digital System Design**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW |

**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 programmed specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Department of Computer Engineering | 2. University Department/Centre |
| Digital System Design / COE 205 | 3. Course title/code& Description |
| Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 4. Modes of Attendance offered |
| 1st & 2nd / Academic Year 2020-2021 | 5. Semester/Year |
| 90 hrs. / 3 hrs. per week Theory  60 hrs. / 2 hrs. per week Lab. | 6. Number of hours tuition (total) |
| November 2020 | 7. Date of production/revision of this specification |
| 8. Aims of the Course | |
| Briefly, Goals and objectives of the completed course are:   1. How to relate the skills and concepts learned from fundamental digital design to understand advance digital design. 2. How to use the learned skills to understand, derive, and solve the digital & logical equations of digital circuit, and system in various objects (e.g., microprocessor I & II, computer architecture I & II, digital electronics, digital communication, I/O devices etc.). 3. Representation, the fundamental concepts to advanced Digital design and implementation by understanding practical digital devices. | |

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| 9· Learning Outcomes, Teaching , Learning and Assessment Method |
| A- Cognitive goals:  A1- Simplify & solved any Boolean equation until to 6 variables using K-map method.  A2- Acknowledge how to design digital problem using state machine approach.  A3- Use registers & registers application in a digital system.  A4- Analysis any sequential circuit of a digital system using state machine design.  A5- Design practical & complex problem using algorithm state machine (ASM) chart approach.  A6- Realize digital system using programmable devices (PLA, ROM, …, etc.)  A7- Separate between synchronous & asynchronous state machine approach in a design.  A8- Design a digital circuit & solve practical problems by applying VHDL language in a design |
| B- The skills goals special to the course  B1- Simplify & solved any Boolean equation until to 6 variables using K-map method.  B2- Acknowledge how to design digital problem using state machine approach.  B3- Use registers & registers application in a digital system.  B4- Analysis any sequential circuit of a digital system using state machine design.  B5- Design practical & complex problem using algorithm state machine (ASM) chart approach.  B6- Realize digital system using programmable devices (PLA, ROM, …, etc.)  B7- Separate between synchronous & asynchronous state machine approach in a design.  B8- Design a digital circuit & solve practical problems by applying VHDL language in a design |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

10.Course Structure

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| --- | --- | --- | --- | --- | --- |
| Week | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the.  2 exp. | Item 1 of section 10 | **Sequence generator & detector, PN generator** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 2 | 2 the.  2 exp. | Item 2 & 4 of section 10 | **Introduction of Synchronous sequential logic** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 3 | 2 the.  2 exp. | Item 5 of section 10 | **State diagram** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 4 | 2 the.  2 exp. | Item 1 to 4 of section 10 | **Tutorials & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 5 | 2 the.  2 exp. | Item 5 of section 10 | **State diagram and state diagram reduction** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 6 | 2 the.  2 exp. | From 1 to 4 of section 10 | **Feedback shift registers, sequential circuits using a register and a combination circuit** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 7 | 2 the.  2 exp. | Item 4 of section 10 | **Analysis of Synchronous sequential logic** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 8 | 2 the.  2 exp. | Item 8 of section 10 | **Introduce basic VHDL concepts and constructs, Signal and constant** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 9 | 2 the.  2 exp. | Item 8 of section 10 | **VHDL description of combinational circuits, VHDL models& operators** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 10 | 2 the.  2 exp. | Item 8 of section 10 | **Packages and libraries, IEEE standard logic & Modeling Flip-Flops using VHDL processes** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 11 | 2 the.  2 exp. | Item 8 of section 10 | **Modeling registers and counters using VHDL processes & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 12 | 2 the.  2 exp. | Item 8 of section 10 | **Modeling combinational logic using VHDL processes** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 13 | 2 the.  2 exp. | Item 8 of section 10 | **VHDL Modeling of a sequential machine, More about processes and sequential statements** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 14 | 2 the.  2 exp. | Item 7 of section 10 | **Introduction of Asynchronous sequential logic** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 15 | 2 the.  2 exp. | Item 7 of section 10 | **Non- critical race, stability consideration, Hazard (Static, Dynamic & Essential)** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 16 | 2 the.  2 exp. | Item 7 of section 10 | **Determination of flow table for problem reduction of the primitive flow table** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 17 | 2 the.  2 exp. | From 1 to 8 of section 10 | **Tutorial & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 18 | 2 the.  2 exp. | Item 7 of section 10 | **Conversion of primitive flow table to transition table and logic diagram** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 19 | 2 the.  2 exp. | Item 7 of section 10 | **State assignment, merging rows of the flow table, race free assignment, hazard,** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 20 | 2 the.  2 exp. | Item 7 of section 10 | **implementation of sequential circuit with SR latches, Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 21 | 2 the.  2 exp. | Item 6 of section 10 | **Logic circuits and programmable logic devices, PLA, PAL, ROM, FPGA** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 22 | 2 the.  2 exp. | Item 5 of section 10 | **Introduction of Algorithmic state machines (ASM), ASM Chart & Table** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 23 | 2 the.  2 exp. | Item 5 of section 10 | **Practical problems using ASM chart** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 24 | 2 the.  2 exp. | Item 5 of section 10 | **Practical problems using ASM chart** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 25 | 2 the.  2 exp. | From 5 to 6 of section 10 | **Realization ASM Chart using PLA & ROM devices** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 26 | 2 the.  2 exp. | Item 8 of section 10 | **Design of simple processor in VHDL** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 27 | 2 the.  2 exp. | Item 8 of section 10 | **Design of simple processor in VHDL** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 28 | 2 the.  2 exp. | Item 8 of section 10 | **Design of simple processor in VHDL** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 29 | 2 the.  2 exp. | Item 8 of section 10 | **Design of simple processor in VHDL** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 30 | 2 the.  2 exp. | From 1 to 8 of section 10 | **Tutorial & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | "Fundamentals of Logic Design", Charles H. Roth & Larry L. Kinney, all edition until 6th edition in 2010-2014.  "Principles of Modern Digital Design", Parag K. Lala, 2007.  "VHDL: Programming by Example", Douglas L. Perry Fourth Edition, 2002.  “Digital Systems Design with VHDL: Programming by Examples”, Shonak Bansal, 2017.  “Introduction to VHDL programming”, Juan A. Clemente, 2014. |
| 2. Main references (sources) | "Fundamentals of Logic Design", Charles H. Roth & Larry L. Kinney, all edition until 6th edition in 2010-2014.  "Principles of Modern Digital Design", Parag K. Lala, 2007.  "VHDL: Programming by Example", Douglas L. Perry Fourth Edition, 2002.  “Digital Systems Design with VHDL: Programming by Examples”, Shonak Bansal, 2017.  “Introduction to VHDL programming”, Juan A. Clemente, 2014. |
| A- Recommended books and references (scientific journals, reports…). | Deshmane, P. D., Lad, M., Mhetre, P., & Kumar, S. (2014). 8 Bit Microprocessor Using VHDL. International Journal of Latest Technology in Engineering, Management & Applied Science, 241-246.  Kamaljeet, Kaur, G., & Yadav, L. (2015). STUDY OF Programmable Logic Devices. International Journal of Innovative Research in Technology, 313-317.  Hasan, M., Podder, P., Thakur, J. M., Haque, A., Sayeed, M., & Islam, R. (2014). VHDL Implementation of Moore and Mealy State Machine. International Journal of Electrical and Electronics Research, 174-181. |
| B-Electronic references, Internet sites… |  |

12. The development of the curriculum plan

Continuous improvement of curriculum and faculty members through training programs.

**TEMPLATE FOR COURSE SPECIFICATION**

**Data Structures and Computer Algorithms**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW |

**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 programmed specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Department of Computer Engineering | 2. University Department/Centre |
| Data structures and Computer Algorithms/ COE206 | 3. Course title/code& Description |
| Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 4. Modes of Attendance offered |
| 1st & 2nd / Academic Year 2020-2021 | 5. Semester/Year |
| 60 hrs. / 2 hrs. per week theory  60 hrs. / 2 hrs. per week Lab. | 6. Number of hours tuition (total) |
| November 2020 | 7. Date of production/revision of this specification |
| 8. Aims of the Course | |
| 1. In this course we have tried to emphasize the following notions to our students: 2. Learning how to write programs in Object Oriented Programming (OOP) style using JAVA. 3. The ability to define at a sufficiently high level of abstraction to data structures and algorithms that are needed. 4. The ability to devise alternative implementations of data structure. 5. The ability to write a correct algorithm and for all programs tried our best to structure them appropriately. 6. To be able to describe the accessing functions of all the fundamentals of data structures (linear list, linked list, stack, queue, tree, binary search tree, table, and the hash techniques) and its operations with the help of object-oriented design. | |

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| 9· Learning Outcomes, Teaching , Learning and Assessment Method |
| A- Cognitive goals:  A1- Upon Completion of this course the students will acquire the following skills:  A2- Writing programs in OOP style after knowing through the course the advantages of OOP in writing any software.  A3- Using the Object-Oriented Design (OOD) in his/her projects.  A4- Design and implement the solution to a problem with the use of an appropriate data structures. |
| B. The skills goals special to the course  B1- Upon Completion of this course the students will acquire the following skills:  B2- Writing programs in OOP style after knowing through the course the advantages of OOP in writing any software.  B3- Using the Object-Oriented Design (OOD) in his/her projects.  B4- Design and implement the solution to a problem with the use of an appropriate data structures.  Teaching and Learning Methods.   1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Seminars. 8. In- and Out-Class oral conservations. 9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

10.Course Structure

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| week | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Basics of OOP** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 2 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Types of member functions** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 3 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Initializing functions/data broker functions** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 4 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Implementation functions/access functions/ auxiliary functions and constant functions** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 5 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Class instantiation** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 6 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Array of class objects/ objects as function arguments** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 7 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Constructors(initializing object/default constructor)** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 8 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Copy constructor/ using custom constructor** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 9 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Destructors** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 10 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Class types, class scope, empty class, nested class** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 11 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Data members, static members** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 12 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Overloading (non-member/ member functions) conversion function and friend functions** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 13 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Overloaded constructor, overloaded operator, and operator as a function call** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 14 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Templates** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 15 | 2 the.  2 exp. | From 1 to 2 of section 10 | **The "this" pointer** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 16 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Simple arrays** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 17 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Multidimensional arrays** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 18 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Lists** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 19 | 2 the.  2 exp. | From 1 to 2 of section 10 | **implantation via arrays, dynamic memory, and via linked** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 20 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Order list** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 21 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Stacks, stack implementations** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 22 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Queues, Queue implementations** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 23 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Circular queue** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 24 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Tables** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 25 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Hash technique** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 26 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Methods for handling collisions** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 27 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Trees** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 28 | 2 the.  2 exp. | From 1 to 2 of section 10 | **building binary tree** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 29 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Tree traversal/ preorder, in order, and post order** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 30 | 2 the.  2 exp. | From 1 to 2 of section 10 | **Binary search tree** | From 1 to12 of section 11 | From 1 to 4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | Data Structures and Algorithms in Java™  Michael T. Goodrich, Roberto Tamassia Michael H. Goldwasser, 2014 John Wiley & Sons, Inc.  ● Problem Solving with Algorithms and Data Structures  Brad Miller, David Ranum. September 22, 2013. |
| 2. Main references (sources) | Laboratory experiments in the programming Lab ) of the department.  Available websites related to the subject |
| A- Recommended books and references (scientific journals, reports…). | Extra lectures by foreign guest lecturers |
| B-Electronic references, Internet sites… |  |

Continuous improvement of curriculum and faculty members through training programs.

12. The development of the curriculum plan

**TEMPLATE FOR COURSE SPECIFICATION**

**Communications**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW |

**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 programmed specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Department of Computer Engineering | 2. University Department/Centre |
| Communications / COE 207 | 3. Course title/code& Description |
| Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 4. Modes of Attendance offered |
| 1st & 2nd / Academic Year 2020-2021 | 5. Semester/Year |
| 120 hrs. / 4 hrs. per week .  60 hrs./ 2 hrs. per week Theory.  60 hrs./ 2 hrs. per week Lab. | 6. Number of hours tuition (total) |
| November 2020 | 7. Date of production/revision of this specification |
| 8. Aims of the Course | |
| 1. What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)? 2. To understand the following:- 3. Analog modulation and demodulation such as (AM, DSB-SC, SSB, FM, PM) 4. Digital Modulation and Demodulation such as (PCM, DM, ADM, ASK, FSK, PSK, DPSK) 5. Information theory (Measure of information entropy and channel capacity, Source Coding, Channel coding) | |

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| 9· Learning Outcomes, Teaching , Learning and Assessment Method |
| A- Cognitive goals:  A1- What are the knowledge and skills expected to be attained by the student upon completion of the course(should be measurable)?  A2- The student will be able to:  A3- Analyze a complete analog and digital communication system.  A4- Measure of information entropy and channel capacity.  A5- The ability to coding any message, by using Source Coding procedure.  A6- The ability to find the error detection and correction for digital channels. |
| B. The skills goals special to the course  B1- What are the knowledge and skills expected to be attained by the student upon completion of the course(should be measurable)?  B2- The student will be able to:  B3- Analyze a complete analog and digital communication system.  B4- Measure of information entropy and channel capacity.  B5- The ability to coding any message, by using Source Coding procedure.  B6- The ability to find the error detection and correction for digital channels.  Teaching and Learning Methods.   1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Seminars. 8. In- and Out-Class oral conservations.   Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

10. Course Structure

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| week | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the.  2 lab. | Item 1 of section 10 | **Definitions, Elements of communication system, types of communication system** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 2 | 2 the.  2 lab. | Item 1 of section 10 | **Fourier series, Fourier transform** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 3 | 2 the.  2 lab. | Item 1 of section 10 | **Normalized power, Normalized energy, Convolution** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 4 | 2 the.  2 lab. | Item 1 of section 10 | **Unit impulse, Frequency response, Bandwidth of the system and signal** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 5 | 2 the.  2 lab. | Item 1 of section 10 | **Analog signal transmission, Modulation, Types of modulation, Reasons for modulation** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 6 | 2 the.  2 lab. | Item 1 of section 10 | **Amplitude modulation (AM), Normal AM (DSB-LC), Carrier and sideband power in AM** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 7 | 2 the.  2 lab. | Item 1 of section 10 | **Generation of AM signal, Modulator using multiplier, Modulator using non-linearity, Switching modulation, Detection of AM signal** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 8 | 2 the.  2 lab. | Item 1 of section 10 | **DSB-SC modulation, Generation of DSB-SC signal, Balanced modulator, Ring modulator, Detection of DSB-SC signal (product detector)** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 9 | 2 the.  2 lab. | Item 1 of section 10 | **SSB modulation, Generation of SSB signal, Detection of SSB signal, VSB modulation, Superheterodyne AM receiver** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 10 | 2 the.  2 lab. | Item 1 of section 10 | **Angle modulation , Narrowband FM, generation of NBFM signal** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 11 | 2 the.  2 lab. | Item 1 of section 10 | **Wideband FM, Power, and bandwidth of FM signal** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 12 | 2 the.  2 lab. | Item 1 of section 10 | **Generation of FM signal, Direct method, Indirect method** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 13 | 2 the.  2 lab. | Item 1 of section 10 | **FM detection, Frequency discriminator, Zero crossing detector** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 14 | 2 the.  2 lab. | Item 1 of section 10 | **Superheterodyne FM receiver,** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 15 | 2 the.  2 lab. | Item 1 of section 10 | **Frequency division multiplexing (FDM)** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 16 | 2 the.  2 lab. | Item 1 of section 10 | **Noise in AM system, Noise in DSB-SC system** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 17 | 2 the.  2 lab. | Item 1 of section 10 | **Noise in FM system** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 18 | 2 the.  2 lab. | Item 1 of section 10 | **Digital communication, Sampling theory** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 19 | 2 the.  2 lab. | Item 1 of section 10 | **Pulse code modulation (PCM)** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 20 | 2 the.  2 lab. | Item 1 of section 10 | **Bandwidth and signal rate for PCM** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 21 | 2 the.  2 lab. | Item 1 of section 10 | **Noise in PCM system** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 22 | 2 the.  2 lab. | Item 1 of section 10 | **ASK, FSK, PSK, Generation and detection of ASK signal** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 23 | 2 the.  2 lab. | Item 1 of section 10 | **Generation and detection of PSK signal** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 24 | 2 the.  2 lab. | Item 1 of section 10 | **Differential PSK, Generation of FSK signal** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 25 | 2 the.  2 lab. | Item 1 of section 10 | **Detection of FSK signal (Using BPF, Using multiplier), Comparison of binary digital modulation systems** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 26 | 2 the.  2 lab. | Item 1 of section 10 | **TDM, TDM-telephony system** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 27 | 2 the.  2 lab. | Item 2 of section 10 | **Measure of information** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 28 | 2 the.  2 lab. | Item 2 of section 10 | **Memoryless channel, channel capacity** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 29 | 2 the.  2 lab. | Item 3 of section 10 | **Source Coding** | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 30 | 2 the.  2 lab. | Item 3 of section 10 | **Channel coding** | From 1 to12 of section 11 | From 1 to4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | 1- Principles of Communications, Systems, Modulation, and Noise. Rodger E. Ziemer / William H. Tranter. Fifth Edition. John Wiley, 2002. |
| 2. Main references (sources) | - Introduction to Communications Systems.  Ferrel G.Stremler. 3rd edition,  Addison Wesley, 1990. |
| A- Recommended books and references (scientific journals, reports…). | Buchali, F., Böcherer, G., Idler, W., Schmalen, L., Schulte, P., & Steiner, F. (2015, September). Experimental demonstration of capacity increase and rate-adaptation by probabilistically shaped 64-QAM. In Optical Communication (ECOC), 2015 European Conference on (pp. 1-3). IEEE.‏  Geyer, J. C., et al. "Practical implementation of higher order modulation beyond 16-QAM." Optical Fiber Communications Conference and Exhibition (OFC), 2015. IEEE, 2015.‏  Li, Xinying, et al. "QAM vector signal generation by optical carrier suppression and precoding techniques." IEEE Photonics Technology Letters 27.18 (2015): 1977-1980. |
| B-Electronic references, Internet  sites… |  |

12. The development of the curriculum plan

Continuous improvement of curriculum and faculty members through training programs.

**Third Stage**

**TEMPLATE FOR COURSE SPECIFICATION**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

Computer Architecture I

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Computer Architecture I / COE301 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st & 2nd semester / Academic Year 2020 – 2021. |
| 6. Number of hours tuition (total) | 90 hrs. / 3 hrs. per week |
| 7. Date of production/revision of this  Specification | October 28, 2020 |
| 8. Aims of the Course | |
| The course provides the basic knowledge necessary to understand the hardware operation of digital computers and covers some of the subjects associated with computer hardware. | |

9· Learning Outcomes, Teaching, Learning and Assessment Method

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| 1. Cognitive goals:   A1. Write RTL for hardware jobs.  A2. Define and explain the principles of computer architecture and the interfacing between its hardware and software components  A3. Understand the data path inside a processor  A4. Understand the micro programmed control organization  A5. Know the organization and architecture of the CPU with an emphasis on the user's view of the computer.  A6.Understand of parallel processing and pipeline.  A7.Understand of architectural blocks involved in computer arithmetic, both integer and floating point.  A8. Understand computer busses and input/output peripherals.  A9. Analyze computer memory hierarchy  A10. Understand multi-processor architectures. |
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| B. The skills goals special to the course  B1- Mathematical concepts and basic algorithms for describing and solving engineering problems.  B2 - Initial developments in Computer Architecture majors.  B3 - developing the ability to conduct experiments and analyze data.  B5- Identifying, formulating and solving Computer Architecture problems using modern engineering tools, techniques, and skills,  B6 - cooperation in group projects,  B7 - Developing written and verbal communication skills through presentations from the project results,  B8 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.  Teaching and Learning Methods.   1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Seminars. 8. In- and Out-Class oral conservations.   9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

***10. Course Structure***

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| --- | --- | --- | --- | --- | --- |
| weak | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| 1 | 3 the. | Item 1 of section 10 | **Register Transfer Language** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 2 | 3 the. | Item 1 of section 10 | **Arithmetic Micro operations** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 3 | 3 the. | Item 2 of section 10 | **Instruction Codes** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 4 | 3 the. | Item 2 of section 10 | **Timing and Control** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 5 | 3 the. | Item 2 of section 10 | **Memory-Reference Instructions** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 6 | 3 the. | Item 3 of section 10 | **Complete Computer Description** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 7 | 3 the. | Item 3 of section 10 | **Design of Accumulator Logic** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 8 | 3 the. | Item 3of section 10 | **The Assembler** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 9 | 3 the. | Item 3of section 10 | **Control Memory** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 10 | 3 the. | Item 4 of section 10 | **Micro program Example** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 11 | 3 the. | Item 4 section 10 | **Design of Control Unit** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 12 | 3 the. | Item 5 of section 10 | **Central Processing Unit** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 13 | 3 the. | Item 5 of section 10 | **Instruction Formats** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 14 | 3 the. | Item 5 of section 10 | **Addressing Modes** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 15 | 3 the. | Item 5 of section 10 | **Program Control** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 16 | 3 the. | Item 5 of section 10 | **Reduced Instruction Set Computer** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 17 | 3 the. | Item 6 of section 10 | **Parallel Processing** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 18 | 3 the. | Item 6 of section 10 | **Instruction Pipeline** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 19 | 3 the. | Item 6 of section 10 | **Vector Processing** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 20 | 3 the. | Item 7 of section 10 | **Computer Arithmetic** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 21 | 3 the. | Item 7 of section 10 | **Division Algorithms** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 22 | 3 the. | Item 7 of section 10 | **Decimal Arithmetic Unit** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 23 | 3 the. | Item 8 of section 10 | **Input-Output Organization** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 24 | 3 the. | Item 8 of section 10 | **Asynchronous Data Transfer** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 25 | 3 the. | Item 8 of section 10 | **Priority Interrupt** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 26 | 3 the. | Item 8 of section 10 | **Input-Output Processor** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 27 | 3 the. | Item 9 of section 10 | **Memory Organization** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 28 | 3 the. | Item 9 of section 10 | **Associative Memory** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |
| 29 | 3 the. | Item 10 of section 10 | **Characteristics of Multiprocessors** | From 1 to 9 of section 11 | From 1 to 4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | Books:   * M. Morris. Mano, "Computer System Architecture" 3rd Edition * William Stalling, "Computer Organization and Architecture" 6th edition. |
| 2. Main references (sources) | * Computer Architecture A Quantitative Approach, Sixth Edition, John L. Hennessy, David A. Patterson, 2019. |
| A- Recommended books and references (scientific journals, reports…). | * P. Trivedi and R. P. Tripathi, "Design & analysis of 16 bit RISC processor using low power pipelining," International Conference on Computing, Communication & Automation, Noida, 2015, pp. 1294-1297. * B. W. Bomar, "Implementation of microprogrammed control in FPGAs," in *IEEE Transactions on Industrial Electronics*, vol. 49, no. 2, pp. 415-422, Apr 2002. |
| B-Electronic references, Internet  sites… | * J. L. Cruz, A. Gonzalez, M. Valero and N. P. Topham, "Multiple-banked register file architectures," Proceedings of 27th International Symposium on Computer Architecture (IEEE Cat. No.RS00201), Vancouver, BC, Canada, 2000, pp. 316-325. * C. Hamacher, Z. Vranesic, S. Zaky, N. Manjikian "Computer Organization and Embedded Systems", Sixth Edition |

1. The development of the curriculum plan

Continuous developing academic curricula in line with the scientific development

**TEMPLATE FOR COURSE SPECIFICATION**

**Digital Control Systems**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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 programmer

specification.

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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Digital Control Systems (COE 302) |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects |
| 5. Semester/Year | 1st & 2nd semester / Academic Year 2020 – 2021. |
| 6. Number of hours tuition (total) | 90 hrs. /3 hrs. Per week Theory |
| 7. Date of production/revision of this  Specification | 20-10-2020 |
| 8. Aims of the Course | |
| 1. This subject has been prepared as a comprehensive for a first study of control engineering. | |
| 2- This subject also helps the students to design control systems for variety of engineering applications | |
| 3- This subject covers both conventional control theory and modern control theory in digital and continuous systems. | |

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| 9· Learning Outcomes, Teaching , Learning and Assessment Method |
| 1. Cognitive goals.   A1- Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems  A2- Learn to find transfer functions for linear time-invariant electrical, mechanical and electromechanical systems  A3- Learn how to describe and quantify transients-response specifications of first and second-order systems  A4- Learn how to find the steady-state error for unity and non-unity-gain feedback  A5- Learn how to determine the stability of a system  A6 - Learn how to use root-locus and frequency domain methods to design basic controllers |
| 1. The skills goals special to the course.   B1. Recognize between open-loop and closed-loop control system in terms of their applications  B2. Find the response of closed loop system (Transient response and steady-state response)  B3. Sketch the root locus of different order systems  B4.How to check the stability of Control systems in time domain and frequency domain  B5.Compute the response of sampled data systems and Check the stability of Digital control system |
| Teaching and Learning Methods |
| 1. Lectures 2. Tutorials 3. Homework and Assignments. 4. Lab. Experiments and Reports. 5. Tests and Exams. 6. In-Class Questions and Discussions. 7. Connection between Theory and Application. 8. Seminars. 9. In- and Out-Class oral conservations. |
| Assessment methods |
| 1. Examinations, Tests, and Quizzes.  2. Presentations and student Engagement during Lectures.  3. Extracurricular Activities. |
| C. Affective and value goals  C1. Designing  C2. Analyzing  C3. Ability to work within the team.  C4. Problem solving, by applying the learning outcomes and subject -specific skills to solve practical design problems. |
| Teaching and Learning Methods |
| 1- Assignment  2- Seminars  3- Group Discussion |
| Assessment methods |
| 1. Quizzes 2. Test 3. Homework 4. Oral Discussion 5. Independent research. 6. General and Transferable Skills (other skills relevant to employability and personal development)   D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation. |

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| 10. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Open loop system, closed loop system,** | A1 | 2 theory  1 tutorial  2 labs. | 1-2 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Classification of feedback control system**  **Mathematical models : Models of electrical systems, Mechanical, thermal and liquid system,** | A2 | 2 theory  1 tutorial  2 labs. | 3-4 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Transfer function concept, D.C. servo and A.C. servo motors as examples of electromechanical system,** | A2 | 2 theory  1 tutorial  2 labs. | 5 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Block diagram algebra, signal flow graphs.** | A1, A2 | 2 theory  1 tutorial  2 labs. | 6 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Transient response analysis**  **- Transient response specification** | A3 | 2 theory  1 tutorial  2 labs. | 7 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Stability. - Routh's stability criterion. Study state error coefficient. Static error coefficients. Dynamic error coefficients** | A4, A5 | 2 theory  1 tutorial  2 labs. | 8-10 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Root locus method of analysis and design**  **Sketch the Root locus for first order system, second order system and higher order system** | A6 | 2 theory  1 tutorial  2 labs. | 11-14 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Frequency response methods : Introduction**  **Main concept of Bode.**  **Frequency response measurements. Performance Specifications in frequency domain. Log magnitude and phase Diagrams** | A6 | 2 theory  1 tutorial  2 labs. | 15-18 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Stability in Frequency domain: Nyquist Criterion** | A5,A6 | 2 theory  1 tutorial  2 labs. | 19 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Introduction to digital control systems** | A1 | 2 theory  1 tutorial  2 labs. | 20 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Digital Computer Control System Applications** | A1 | 2 theory  1 tutorial  2 labs. | 21 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Sampled-Data Systems** | A1 | 2 theory  1 tutorial  2 labs. | 22 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Stability of Digital Systems: Jury Test** | A5 | 2 theory  1 tutorial  2 labs. | 23 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Closed-Loop Feedback Sampled-Data Systems** | A1,A5 | 2 theory  1 tutorial  2 labs. | 24 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Closed-Loop Systems with Digital Computer Compensation** | A1,A5 | 2 theory  1 tutorial  2 labs. | 25 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Design of digital controller based on root locus** | A1,A5 | 2 theory  1 tutorial  2 labs. | 26-28 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Design of digital controller based on root locus** | A1,A5 | 2 theory  1 tutorial  2 labs. | 26-28 |
| From 1 to3 of Assessment Method | From 1 to9 of Teaching and Learning Methods | **Design of digital controller based on continuous controller** | A1,A5 | 2 theory  1 tutorial  2 labs. | 29-30 |

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| 11. Infrastructure | |
| 1. Books Required reading: | Modern Control Engineering, Ogata K. Fourth edition , Prentice-Hall ,2002.  Modern Control System Analysis and DesignUsing MATLAB and Simulink, Bishop R., Addison-Wesley ,2000. |
| 2. Main references (sources) | Modern control systems, Drof R. C. and Bishop R, 12th edition ,Prentice-Hall, 2010  Feedback control of dynamic systems, Franklin G.F. and et.al., Prentice-Hall, 2006.  Digital Control Systems Analysis and design, charles H. Philips and et. al. third edition , Prentice-Hall,2001  Discrete- time control systems , Ogata K., Second edition Prentice-Hall ,1995 |
| A- Recommended books and references (scientific journals, reports…). | Feng, "A Survey on Analysis and Design of Model-Based Fuzzy Control Systems", IEEE Trans. Fuzzy Systems, Vol. 14, No. 5, October 2006.  A. J. Calise et al., "Adaptive Output Feedback Control of Nonlinear Systems using Neural Networks", Elsevier Automatica, Vol. 37, Issue 8, August 2001.  B. Chen et al., "Composite Nonlinear Feedback Control for Linear Systems With Input Saturation Theory and an Application", IEEE Trans. Automatic Control, Vol. 48, No. 3, March 2003. |
| B-Electronic references, Internet  sites… |  |

Continuous improvement of curriculum and faculty members through training programs.

12. The development of the curriculum plan

**TEMPLATE FOR COURSE SPECIFICATION**

**Microprocessors and Microcomputers II**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad | |
| 2. University Department/Centre | Computer Engineering Department (COED) | |
| 3. Course title/code | Microprocessors and Microcomputers II  COE 303 | |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects | |
| 5. Semester/Year | 1st & 2nd semester / Academic Year 2020 – 2021. | |
| 6. Number of hours tuition (total) | 2 Theory hours per week (60 hours total)  1 Tutorial hour per week (30 hours total)  2 Lab. hours per week (60 hours total) | |
| 7. Date of production/revision of this  Specification | November/2020 | |
| 1. Aims of the Course 2. How to relate the skills and concepts learned from Microprocessor/   Microcomputer I to understand Microprocessor/Microcomputer II   1. Teaching students how to design microprocessor-based embedded systems: 2. understand the different components of a microcomputer system 3. design some parts of a microcomputer system 4. develop the required software to program it | |

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| 1. Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals.   A1. Microprocessor-based microcomputer design.  A2. Memory interface of different microprocessors  A3. Peripheral interfaces  A4. Interrupt driven operation and interface |
| B. The skills goals special to the course.  B1. How to interface memory to microprocessors with different data bus size.  B2. How to interface different I/O devices and control them through software.  B3. How to develop interrupt service procedures and expand the interrupt structure through the 8259A interrupt controller |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions. |
| Assessment methods |
| 1. Lab  2. Quizzes and exams  3. homework  4. assignments |
| C. Affective and value goals  C1. Ability to Analyze  C2. Ability to Design  C3. Ability to Problem solving |
| Teaching and Learning Methods |
| 1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions |
| Assessment methods |
| 1. Quizzes and exams  2. homework  3. Lab  4. assignments  D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

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| --- | --- | --- | --- | --- | --- |
| 10. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Review of Intel Microprocessors 8088-Pentium hardware and software architecture | A1 | 2 Th.  1 Tu.  2 Lab. | **1** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Memory management in protected mode | A1 | 2 Th.  1 Tu.  2 Lab. | **2** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | Memory management in protected mode | A1 | 2 Th.  1 Tu.  2 Lab. | **3** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Memory interface (8-bit) | A2 | 2 Th.  1 Tu.  2 Lab. | **4** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | Introduction to 16 bit memory interface | A2 | 2 Th.  1 Tu.  2 Lab. | **5** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Memory interface (16-bit) | A2 | 2 Th.  1 Tu.  2 Lab. | **6** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Memory interface (32-bit) | A2 | 2 Th.  1 Tu.  2 Lab. | **7** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Memory interface (64-bit) | A2 | 2 Th.  1 Tu.  2 Lab. | **8** |
|  |  | Exam |  | 2 Th.  1 Tu.  2 Lab. | **9** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | Basic I/O interface | A3 | 2 Th.  1 Tu.  2 Lab. | **10** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | Basic I/O interface and studying some I/O devices | A3 | 2 Th.  1 Tu.  2 Lab. | **11** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8255 Programmable peripheral controller mode 0 | A3 | 2 Th.  1 Tu.  2 Lab. | **12** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8255 Programmable peripheral controller mode 0 | A3 | 2 Th.  1 Tu.  2 Lab. | **13** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8255 Programmable peripheral controller mode 0 | A3 | 2 Th.  1 Tu.  2 Lab. | **14** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8255 Programmable peripheral controller mode 1 | A3 | 2 Th.  1 Tu.  2 Lab. | **15** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8255 Programmable peripheral controller mode 1 and mode 2 | A3 | 2 Th.  1 Tu.  2 Lab. | **16** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8279 Keyboard/display interface | A3 | 2 Th.  1 Tu.  2 Lab. | **17** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8279 Keyboard/display interface | A3 | 2 Th.  1 Tu.  2 Lab. | **18** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8279 Keyboard/display interface | A3 | 2 Th.  1 Tu.  2 Lab. | **19** |
|  |  | Exam |  | 2 Th.  1 Tu.  2 Lab. | **20** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | 16550 serial communication interface | A3 | 2 Th.  1 Tu.  2 Lab. | **21** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | 8254 Programmable interval timer | A3 | 2 Th.  1 Tu.  2 Lab. | **22** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | 8254 Programmable interval timer | A3 | 2 Th.  1 Tu.  2 Lab. | **23** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | Interrupt driven I/O devices | A4 | 2 Th.  1 Tu.  2 Lab. | **24** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8259 Programmable Interrupt controller | A4 | 2 Th.  1 Tu.  2 Lab. | **25** |
| Items 1 to 4 of Assessment methods | Items 1 to 4 of teaching and learning methods | 8259 Programmable Interrupt controller | A4 | 2 Th.  1 Tu.  2 Lab. | **26** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Direct Memory Access I/O devices | A3 | 2 Th.  1 Tu.  2 Lab. | **27** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | Direct Memory Access I/O devices | A3 | 2 Th.  1 Tu.  2 Lab. | **28** |
| Items 1, 2, and 4 of Assessment methods | Items 1, 2, and 4 of teaching and learning methods | 8237 Direct Memory Access Controller | A3 | 2 Th.  1 Tu.  2 Lab. | **29** |
|  |  | Exam |  | 2 Th.  1 Tu.  2 Lab. | **30** |

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| 11. Infrastructure | |
| 1. Books Required reading: | * The Intel Microprocessors, 8086/8088, 80186/80188, 80286,… Core” by Barray B, Brey |
| 2. Main references (sources) | * The Intel Microprocessors, 8086/8088, 80186/80188, 80286,… Core” by Barray B, Brey |
| A- Recommended books and references (scientific journals, reports…). | * Olukotun, Kunle, and Lance Hammond. "The future of microprocessors." Queue 3.7 (2005): 26-29. * Venkatachalam, Vasanth, and Michael Franz. "Power reduction techniques for microprocessor systems." ACM Computing Surveys (CSUR) 37.3 (2005): 195-237. |
| B-Electronic references, Internet  sites… | Extra lectures by foreign guest lecturers |

Continuous improvement of curriculum and faculty members through training

12. The development of the curriculum plan

**TEMPLATE FOR COURSE SPECIFICATION**

**Operating Systems**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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.

|  |  |
| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Operating Systems /COE 304 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects |
| 5. Semester/Year | 1st & 2nd semester / Academic Year 2020 – 2021. |
| 6. Number of hours tuition (total) | 90 hrs. / 3 hrs. per week Theory |
| 7. Date of production/revision of this  Specification | October – 2020 |
| 8. Aims of the Course | |

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| What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)?   1. Present, as clearly and completely as possible, the nature and characteristics of modern day operating systems. 2. Provide a thorough discussion of the fundamentals of operating system design and to relate these to contemporary design issues and to current directions in the development of operating systems. 3. The course mainly will study: Process management. Synchronization, via semaphore operations, of processes executing within a shared memory. Mapping virtual address to physical addresses in paged and segmentation virtual memory system. Page faulting and page replacement algorithms in virtual memory system. Processor scheduling algorithms. |

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| 9. Learning Outcomes, Teaching ,Learning and Assessment Methods |
| 1. Cognitive goals.   A1. Understanding process management, process description, process states, process control block, process switching, mode switching.  A2. Understanding memory management,: partitioning, paging, segmentation .  A3. Understanding virtual memory: paging, segmentation, virtual memory; hardware and control structures.  A4. Processor scheduling: types of processor scheduling, processor scheduling algorithms.  A5. Concurrency, synchronization, mutual exclusion.     1. The skills goals special to the course   B1- Mathematical concepts and basic algorithms for describing and solving engineering problems.  B2 - Initial developments in Computer Architecture majors.  B3 - developing the ability to conduct experiments and analyze data.  B5- Identifying, formulating and solving Computer Architecture problems using modern engineering tools, techniques, and skills,  B6 - cooperation in group projects,  B7 - Developing written and verbal communication skills through presentations from the project results,  B8 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.  Teaching and Learning Methods.   1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Seminars. 8. In- and Out-Class oral conservations.   9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor).  C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1.Thinking of operating system as a supervisor programs, and no H/W without supervisor S/W.  D2.Help students to design and build their OS for different devices.  D3. Writing system software like input/output drivers.  D4. Developing OS for different systems such as embedded systems.  D5. Writing software for controlling devices interfaced to the system. |

10. Course Structure

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| Week | Hours | I Los | Topic title | Teaching method | Assessment  Method |
| 1 | 3 the.  3 the. | Item A1 | **Computer Organization, processor registers instruction** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 2 | 3 the. | Items A1, A2 | **Interrupts, memory organization** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 3 | 3 the. | Item A1 | **I/O Communication Techniques** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 4 | 3 the. | Item A1 | **The evolution of operating systems, modern OS** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 5 | 3 the. | Item A4 | **Time-Sharing, multitasking** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 6 | 3 the. | Item A1 | **Process Description** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 7 | 3 the. | Item A1 | **Process states** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 8 | 3 the. | Item A1 | **Process Control Block** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 9 | 3 the. | Item A1 | **Process switching, mode switching** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 10 | 3 the. | Item A1 | **Operating system Kernel** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 11 | 3 the. | Item A2 | **Memory Management Requirements, partitioning** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 12 | 3 the. | Item A2 | **Paging** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 13 | 3 the. | Item A2 | **Segmentation** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 14 | 3 the. | Item A3 | **Virtual memory: paging** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 15 | 3 the. | Item A3 | **Virtual memory: Segmentation** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 16 | 3 the. | Item A3 | **VM; Hardware and control structures** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 17 | 3 the. | Item A3 | **VM: Operating Systems Software** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 18 | 3 the. | Item A3 | **Page faulting: page Replacement Algorithms** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 19 | 3 the. | Item A4 | **Processor Scheduling** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 20 | 3 the. | Item A4 | **Types of Scheduling** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 21 | 3 the. | Item A4 | **Processor Scheduling Algorithms** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 22 | 3 the. | Item A5 | **Principles of Concurrency** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 23 | 3 the. | Item A5 | **Mutual Exclusion** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 24 | 2 the.  2 exp. | Item A5 | **Synchronization** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 25 | 3 the. | Item A5 | **Mutual Exclusion: Software Support** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 26 | 3 the. | Item A5 | **Mutual Exclusion: Hardware Support** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 27 | 3 the. | Item A5 | **Starvation, Deadlock** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 28 | 3 the. | Item A5 | **Special Machine Instructions** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 29 | 3 the. | Item A5 | **Semaphores** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |
| 30 | 3 the. | Item A5 | **Message Passing** | From 1 to12 of  T-methods | From 1 to4 of  A-methods |

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| 11. Infrastructure | |
| 1. Books Required reading: | Operating Systems by William Stallings, Pearson International Edition, Eighth Edition, 2015. |
| 2. Main references (sources) | 1. Operating Systems Concepts by: Abraham Silberscatz, Peter B. galvin, International Student Edition, 8th Edition, 2010. 2. Operating Systems by Ramez Elmasri, McGRAW-HILL International Edition, 2010. 3. Operating Systems by: H. M. Deitel, Prentice Hall, 3rd Edition,2004. |
| A- Recommended books and references (scientific journals, reports…). | 1. Comparison of different Operating System by Niti gupta , Amrita ticku, Manoj kumar3.   Proceedings of National Conference on Recent Advances in Electronics and Communication Engineering (RACE-2014), 28-29 March 2014.   1. Operating System and Decision Making by: Hussain A. Alhassan, Dr. Christian Bach. ASEE 2014 Zone I Conference, April 3-5, 2014, University of Bridgeport, Bridgpeort, CT, USA. 2. Comparative Study of Different Mobile Operating Systems by: T.N.Sharma, Mahender Kr. Beniwal, Arpita Sharma. International Journal of Advancements in Research & Technology, Volume 2, Issue3, March-2013. |
| B-Electronic references, Internet  sites… | Extra lectures by foreign guest lecturers  Available websites related to the subject |

The development of the curriculum plan by updating the references

12. The development of the curriculum plan

**TEMPLATE FOR COURSE SPECIFICATION**

**Computer Networks**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Computer Networks/COE 305 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects |
| 5. Semester/Year | 1st & 2nd semester / Academic Year 2020 – 2021. |
| 6. Number of hours tuition (total) | 90 hrs. / 3 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  Specification | November/2020 |
| 8. Aims of the Course | |
| 1. What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)? 2. As a brief description for the Goals and objectives, by the completion of the course the goals are: 3. Introduce the concepts and meaning of network in live and work. 4. Understand "How it Works?" of every little detail of information transmit from sender to receiver through whole media. 5. Compare the differences of using certain media instead of others. 6. Ability to cope with the accelerated knowledge of the computer networks fields.   Learning the concepts of common network devices, such as routers, switches, servers …etc, which are the nerves of any network all over the world. | |

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| 9· Learning Outcomes, Teaching , Learning and Assessment Method |
| 1. Cognitive goals   A1. Design a complete network project: give the correct decisions of choosing devices, doing all cabling work, and complete configuration of end user devices such as computer and servers.  A2. Analyze the addressing schemes through OSI layers (MAC, IP and Port Addressing).  A3. Trouble shoots and maintains problems that occur in networks through confident list of cause and effect (reason and answer).  A4. Configure Cisco Routers through the use of static and dynamic routing protocols.  A5. Ability to calculate and classify any given IP address   1. The skills goals special to the course.   B1. Know all parts and levels of network.  B2. Network maintenance and developing.  Teaching and Learning Methods   1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions.   Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor).  C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses. |
| Teaching and Learning Method |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Lab. Experiments. 5. Tests and Exams. 6. In-Class Questions and Discussions. 7. Connection between Theory and Application. 8. Field Trips. 9. Extracurricular Activities. 10. Seminars. 11. In- and Out-Class oral conservations. 12. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about  Curriculum and Faculty Member ( Instructor )  D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

10.Course Structure:

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| Weak | Hours | ILos | Topic title | Teaching method | Assessment  Method |
| 1 | 3 the.  2 exp. | Item A1 | Introduction to computer Networks | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 2 | 3 the.  2 exp. | Item A1 | Introduction to computer Networks | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 3 | 3 the.  2 exp. | Item A1 | Introduction to computer Networks | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 4 | 3 the.  2 exp. | Item A1 | Principles of Network Applications | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 5 | 3 the.  2 exp. | Item A1 | The Web and HTTP | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 6 | 3 the.  2 exp. | Item A1 | The Web and HTTP | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 7 | 3 the.  2 exp. | Item A1 | DNS | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 8 | 3 the.  2 exp. | Item A1 | Introduction to Transport Layer | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 9 | 3 the.  2 exp. | Item A1 | UDP | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 10 | 3 the.  2 exp. | Item A1 | Principles of Reliable Data Transfer | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 11 | 3 the.  2 exp. | Item A1 | TCP | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 12 | 3 the.  2 exp. | Item A1 | Pipelined Protocols | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 13 | 3 the.  2 exp. | Item A1 | Flow control | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 14 | 3 the.  2 exp. | Item A1 | Principles of Congestion Control | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 15 | 3 the.  2 exp. | Item A1 | TCP Congestion Control | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 16 | 3 the.  2 exp. | Item A2 | Introduction to Network Layer | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 17 | 3 the.  2 exp. | Item A2 | Virtual Circuit and Datagram Networks | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 18 | 3 the.  2 exp. | Item A2 | The Router Internals | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 19 | 3 the.  2 exp. | Item A2 | The Internet Protocol (IP) | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 20 | 3 the.  2 exp. | Item A2 | Routing Algorithms | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 21 | 3 the.  2 exp. | Item A2 | Routing Algorithms | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 22 | 3 the.  2 exp. | Item A2 | Routing in the Internet | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 23 | 3 the.  2 exp. | Item A2 | Broadcast and Multicast Routing | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 24 | 3 the.  2 exp. | Item A3 | Introduction to Data Link Layer | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 25 | 3 the.  2 exp. | Item A3 | Error Detection and Correction Techniques | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 26 | 3 the.  2 exp. | Item A3 | Multiple Access Links and Protocols | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 27 | 3 the.  2 exp. | Item A4, A5 | Switched LANs | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 28 | 3 the.  2 exp. | Item A4, A5 | LAN Virtualization | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 29 | 3 the.  2 exp. | Item A4, A5 | Data Center Networking | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 30 | 3 the.  2 exp. | Item A4, A5 | Physical Layer | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |

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| 11. Infrastructure | |
| 1. Books Required reading: | * Computer Network A Top Down Approach, by *James F. Kourse*, 6 th edition 2017. |
| 2. Main references (sources) | * Data Communications and Networking, by *Behrouz A. Forouzan* , 5th Edition 2013. * Computer Network by *Andrew S. Tanenbaum*, 5th Edition 2011. * TCP/IP Protocol Suite, by *Behrouz A. Forouzan* , 4th Edition 2010. * Data and Computer Communications, by *William Stallings*, 10th Edition 2014. |
| A- Recommended books and references (scientific journals, reports…). | * Paper1: Wu, C., et al.: WILL: Wireless indoor Localization without site survey. IEEE Trans. Parallel Distrib. Syst. 24(4), 839-848(2013). * Paper2: Vucic, J. and Langer, K.-D., “High-speed visible light communications: State-of-the-art,” in [Optical Fiber Communication Conference and Exposition (OFC/NFOEC), 2012 and the National Fiber Optic Engineers Conference], 1–3 (2012. * J. Korhonen, Y. Wang, "Effect of packet size on loss rate and delay in wireless links," Wireless Communications and Networking Conference, 2005 IEEE , vol.3, no., pp. 1608- 1613 Vol. 3, 13-17 March. |
| B-Electronic references, Internet  sites… | * Available websites related to the subject * Extra lectures by foreign guest lecturers |

12. The development of the curriculum plan

**TEMPLATE FOR COURSE SPECIFICATION**

**Digital Signal Processing**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Digital Signal Processing (DSP)  /COE 306 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects |
| 5. Semester/Year | 1st & 2nd semester / Academic Year 2020 – 2021. |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week. |
| 7. Date of production/revision of this  Specification | November/ 2020 |
| 8. Aims of the Course | |

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| As a brief description, the Goals and objectives by the completion of the course are:   1. To learn the distinction between continuous-time and discrete-time systems and their applications, then provide a thorough discussion of the fundamentals of these system and to relate these to the current directions in the development of digital system. 2. oe HTo understand the specific ways to design digital filters. 3. HofHHTo make use of frequency domain properties and learn the nature of signals and systems. |

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| 9· Learning Outcomes, Teaching ,Learning and Assessment Method  A- Cognitive goals.  A1. An ability to read and comprehend DSP literature at an appropriate level.  A2. An ability both to follow correctly and to construct mathematical proofs of appropriate degrees of complexity.  A3. An understanding of time-domain and frequency-domain analysis.  A4. An appreciation of the importance of DSP for computer engineers.  B. The skills goals special to the course.  B1. Develop the ability of Digital filter design.  B2. Increase the ability of mathematic analysis  B3. Develop the ability of DSP design using computer system.  Teaching and Learning Methods   1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions. 5. Seminar.   Assessment methods  1. Oral Quizzes.  2. Quizzes and exams  3. homework  4. assignments  C. Affective and value goals  C1. Minimization using mathematical simplification.  C2. Developing systems by digital features.  C3. Thinking to live in digital world.  Teaching and Learning Methods   1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions   Assessment methods  Quizzes and exams  2. homework  3. Lab  4. assignments  D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Developing digital processes.  D2. Using special DSP H/W in digital design.  D3. Analysis of special DSP processors. |

10. Course Structure

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| week | Hours | ILos | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the. | Items A1 & A2 | **Basic Concepts of DSP** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 2 | 2 the | Items A1 & A2 | **Properties of systems and signals** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 3 | 2 the | Items A1 & A2 | **linear Time-Invariant (LTI) systems** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 4 | 2 the | Items A1 & A2 | **Basic types of discrete-time signals** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 5 | 2 the | Items A1 & A2 | **Sampling Theory** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 6 | 2 the | Items A1 & A2 | **Quantization Theory** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 7 | 2 the | Items A1 & A2 | **Quantization Theory + Quiz** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 8 | 2 the | Items A1 & A2 | **Difference equations** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 9 | 2 the | Items A1 & A2 | **Convolution** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 10 | 2 the | Items A1 & A2 | **Discrete Convolution** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 11 | 2 the | Items A1 - A2 | **Frequency domain analysis+ Quiz** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 12 | 2 the | Items A1 - A2 | **Frequency response** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 13 | 2 the | Items A1 - A2 | **The discrete Fourier Series (DFS)** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 14 | 2 the | Items A1 - A2 | **The discrete-time Fourier transform (DTFT)** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 15 | 2 the | Items A1 - A2 | **The discrete Fourier transform (DFT)** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 16 | 2 the | Items A1 - A2 | **The fast Fourier transform (FFT)** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 17 | 2 the | Items A1 - A2 | **Quiz** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 18 | 2 the | Items A1 - A3 | **The Z-transform** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 19 | 2 the | Items A1 - A3 | **The Z-transform** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 20 | 2 the | Items A1 - A3 | **The infinite impulse response (IIR) digital filters** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 21 | 2 the | Items A1 - A3 | **The windowing method** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 22 | 2 the | Items A1 - A3 | **The finite-impulse response (FIR) digital filters** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 23 | 2 the | Items A1 - A3 | **Design of FIR digital filters** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 24 | 2 the | Items A1 - A3 | **Quiz+ Seminars** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 25 | 2 the | Items A1 - A3 | **Analog filter design** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 26 | 2 the | Items A1 - A3 | **Butterworth filters** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 27 | 2 the | Items A1 - A3 | **The impulse invariance method** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 28 | 2 the | Items A1 - A3 | **Quiz+** Seminars | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 29 | 2 the | Items A1 - A3 | **The bilinear transformation method** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |
| 30 | 2 the | Items A1 - A4 | **The bilinear transformation method** | From 1 to 12 of  T-Methods | From 1 to4 of  A-Methods |

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| 11. Infrastructure | |
| 1. Books Required reading: | * Tan, Lizhe, and Jean Jiang. Digital signal processing: fundamentals and applications. Academic Press, 2018. * Proakis, J.G., Digital signal processing: principles, algorithms and applications. 2001: Pearson Education India. |
| 2. Main references (sources) | * Smith, S. (2013). Digital signal processing: a practical guide for engineers and scientists. Elsevier. * Lectures on Statistical Signal Processing Paperback – June 5, 2016 by Prof Nuha A. S. Alwan. * L. C. Ludeman, "Fundamentals of digital signal processing", Harper and Row, 1986. |
| A- Recommended books and references (scientific journals, reports…). | 1. D.S. Kim et al., "Auditory Processing of Speech Signals for Robust Speech Recognition in Real-World Noisy Environments", IEEE Trans. Speech and Audio Processing, Vol. 7, No. 1, January 1999. 2. S. Lawrence Marple Jr., "Computing the Discrete-Time ‘Analytic’ Signal Via FFT", IEEE Trans. Signal Processing, Vol. 47, No. 9, September 1999. |
| B-Electronic references, Internet  sites… | Available websites related to the subject. |

Continuous improvement of curriculum and faculty members through training programs. And strengthening a number of faculty members for the higher scientific classes.

12. The development of the curriculum plan

**TEMPLATE FOR COURSE SPECIFICATION**

**Database Systems**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**COURSE SPECIFICATION**

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.

|  |  |
| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Database System/ COE 307 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects |
| 5. Semester/Year | 1st & 2nd semester / Academic Year 2020 – 2021. |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week . |
| 7. Date of production/revision of this  Specification | October / 2020 |
| 8. Aims of the Course | |

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| What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)?  Upon completion of this course the student will be able to:  1. Demonstrate a working knowledge of a particular Database Management System (in Access 2016).  2. Plan, define and design a database.  3. Explain the value of using a Database Management System to store and retrieve information. |

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| 9· Learning Outcomes, Teaching ,Learning and Assessment Method |
| A- Cognitive goals  What is the knowledge and skills expected to be attained by the student upon completion of the course (should be measurable)?  The student will understand:  A1. What the database is, what the different types of databases are.  A2. The main functions of database management system.  A3. How data models can be classified.  A4. The relational database model.  A5. How data redundancy is handled in the relational database model.  A6. Design database model using ERD.  A7. What is normalization?  A8. Advanced Data Modeling.  A9. Database Design.  A10. What is the distributed database system?  B. The skills goals special to the course.  B1. Realizing the Database important.  B2. Designing and modeling some database applications.    Teaching and Learning Methods   1. Lectures 2. Homework 3. Lab. Experiments. 4. Discussions.   Assessment methods  1. Lab  2. Quizzes and exams  3. homework  4. assignments  C. Affective and value goals  C1. Understanding the database concepts.  C2. Understanding database instructions.  C4. Understanding database responsibility of different parameters.  D. General and Transferable Skills (other skills relevant to employability and personal development)  D1. Thinking of database as a supervisor programs, and no H/W without supervisor S/W.  D2.Help students to design and build their database programs.  D3. Writing database codes.  D4. Developing OS for different systems such as embedded systems. |

10.Course Structure

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| week | Hours | ILos | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the.  2 exp. | From 1 to 3 of section 10 | File systems and database | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 2 | 2 the.  2 exp. | From 1 to 3 of section 10 | File systems and database | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 3 | 2 the.  2 exp. | From 1 to 3 of section 10 | File systems and database | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 4 | 2 the.  2 exp. | Item 6 of section 10 | Data Models :Data Model Basic Building Blocks | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 5 | 2 the.  2 exp. | Item 6 of section 10 | Data Models : Business Rules | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 6 | 2 the.  2 exp. | Item 6 of section 10 | Data Models : The Evolution of Data Models | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 7 | 2 the.  2 exp. | Item 6 of section 10 | Data Models :Degrees of Data Abstraction | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 8 | 2 the.  2 exp. | Item 6 of section 10 | Design concepts: The Relational Database Model | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 9 | 2 the.  2 exp. | Item 6 of section 10 | Design concepts: Entity Relationship (ER) Modeling | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 10 | 2 the.  2 exp. | Items 4,5 of section 10 | Design concepts: Relational Algebra | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 11 | 2 the.  2 exp. | Items 4,5 of section 10 | Design concepts: Data Redundancy | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 12 | 2 the.  2 exp. | Items 4,5 of section 10 | Entity relationship modeling | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 13 | 2 the.  2 exp. | Items 4,5 of section 10 | Entity relationship modeling | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 14 | 2 the.  2 exp. | Items 4,5 of section 10 | Developing an ER Diagram | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 15 | 2 the.  2 exp. | Item 7 of section 10 | Normalization of Database Tables | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 16 | 2 the.  2 exp. | Item 7 of section 10 | Normalization of Database Tables | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 17 | 2 the.  2 exp. | Item 7 of section 10 | Normalization of Database Tables | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 18 | 2 the.  2 exp. | Item 7 of section 10 | Denormalization | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 19 | 2 the.  2 exp. | Item 8 of section 10 | Advanced Data Modeling | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 20 | 2 the.  2 exp. | Item 8 of section 10 | The Extended Entity Relationship Model | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 21 | 2 the.  2 exp. | Item 8 of section 10 | Entity Integrity: Selecting Primary Keys | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 22 | 2 the.  2 exp. | Item 9 of section 10 | Database Design: The Information System | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 23 | 2 the.  2 exp. | Item 9 of section 10 | Database Design: The Systems Development Life Cycle | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 24 | 2 the.  2 exp. | Item 9 of section 10 | Database Design: The Database Life Cycle | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 25 | 2 the.  2 exp. | Item 10 of section 10 | Database Design: Conceptual Design | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 26 | 2 the.  2 exp. | Item 10 of section 10 | Database Design: Logical Design and Physical Design | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 27 | 2 the.  2 exp. | Item 10 of section 10 | Database Performance Tuning and Query Optimization | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 28 | 2 the.  2 exp. | Item 10 of section 10 | Database Performance Tuning and Query Optimization | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 29 | 2 the.  2 exp. | Item 10 of section 10 | Distributed systems | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 30 | 2 the.  2 exp. | Item 10 of section 10 | Distributed systems | From 1 to12 of section 11 | From 1 to4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | Database systems (design, implementation and management).by Beter Rob and Carlos Coronel, 14th Edition 2019. |
| 2. Main references (sources) | 1. Database design and programming with Access, SQL and Visual Basic, by John Carter, 2019.   2 -Database Design, and Application Development & Administration |
| A- Recommended books and references (scientific journals, reports…). | 1. Centralized vs. Distributed Databases. Case Study, by Nicoleta Magdalena Iacob1 , Mirela Liliana Moise2, 2015 2. A Comparative Study of Databases with Different Methods of Internal Data Management, by Mokhtar A. Alworafi , Atyaf Dhari, Asma A. Al-Hashmi, 2016. |
| B-Electronic references, Internet  sites… | * Available websites related to the subject * Extra lectures by foreign guest lecturers |

Continuous improvement of curriculum and faculty members through training programs.

12. The development of the curriculum

**Fourth Stage**

**TEMPLATE FOR COURSE SPECIFICATION**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

Internet Technology

**COURSE SPECIFICATION**

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 programmed specification.

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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Internet Technology / COE 401 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st & 2nd / Academic Year 2018 – 2019 |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  Specification | September – 04 / 2020 |
| 8. Aims of the Course | |
| As a brief description for the Goals and objectives, by the completion of the course the goals are:   1. Develop the ability to apply knowledge of Internet Service Providers Types and Switching Types and the Important Internet Protocols and the type of the broadband connection to the end user. 2. Develop skills to communicate effectively through seminars and homework. 3. Prepare students to be active at the practical life after graduate. | |

9· Learning Outcomes, Teaching , Learning and Assessment Method

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| 1. Cognitive goals:   A1. Write RTL for hardware jobs.  A2. Define and explain the principles of Internet Technology and the interfacing between its hardware and software components  A3. Understand the data path inside Internet.  A4. Understand the Internet Technology organization  A5. Know the organization and architecture of the Internet with an emphasis on the user's view of the computer Network.  A6. Understand of layers of protocol and network.  A7. Understand of architectural blocks involved in Internet Technology.  A8. Understand problems of speed and congestion in Internet networks.  A9. Analyze Internet and cloud structures.  A10. Understand Internet architectures. |
| B. The skills goals special to the course  B1- Mathematical concepts and basic algorithms for describing and solving engineering problems.  B2 - Initial developments in Internet Technology majors.  B3 - developing the ability to conduct experiments and analyze data.  B5- Identifying, formulating and solving Internet Technology problems using modern engineering tools, techniques, and skills,  B6 - cooperation in group projects,  B7 - Developing written and verbal communication skills through presentations from the project results,  B8 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.  10. Teaching and Learning Methods.   1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Seminars. 8. In- and Out-Class oral conservations.   9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| Grading Policy  1. Exams and Quizzes: There will be at least seven closed books and notes exams and quizzes during the academic year.  2. Oral and written assessment: The students are encouraged to participate their ideas to solve the problems during the lecture. The oral and written assessment.  3. Final Exam: - The final exam will be comprehensive, closed books and notes.  C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

***10. Course Structure***

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| weak | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| 1 | 2 the.  2 exp. | Item 1 of section 10 | Introduction | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 2 | 2 the.  2 exp. | Item 1 of section 10 | ISP (Internet Service Provider) | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 3 | 2 the.  2 exp. | Item 1 of section 10 | ISP (Internet Service Provider) | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 4 | 2 the.  2 exp. | Item 1 of section 10 | Web Hosting | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 5 | 2 the.  2 exp. | Item 1 &2 of section 10 | Content Delivery Networks | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 6 | 2 the.  2 exp. | Item 1 & 2 of section 10 | Content Delivery Networks | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 7 | 2 the.  2 exp. | Item 1&2 of section 10 | Circuit Switching | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 8 | 2 the.  2 exp. | From 1 to 3of section 10 | Circuit Switching | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 9 | 2 the.  2 exp. | From 1 to 3of section 10 | Dedicated Circuits | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 10 | 2 the.  2 exp. | From 1 to 3of section 10 | Dedicated Circuits | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 11 | 2 the.  2 exp. | From 1 to 3of section 10 | Dedicated Circuits | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 12 | 2 the.  2 exp. | From 1 to 3of section 10 | Packet Switching. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 13 | 2 the.  2 exp. | From 1 to 3of section 10 | Packet Switching. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 14 | 2 the.  2 exp. | From 1 to 3of section 10 | Packet Switching. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 15 | 2 the.  2 exp. | From 1 to 3of section 10 | Broadband Internet Access Technologies. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 16 | 2 the.  2 exp. | From 1 to 3of section 10 | Broadband Internet Access Technologies. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 17 | 2 the.  2 exp. | From 1 to 3of section 10 | Broadband Internet Access Technologies. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 18 | 2 the.  2 exp. | From 1 to 3of section 10 | Broadband Internet Access Technologies. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 19 | 2 the.  2 exp. | From 1 to 3of section 10 | ARP | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 20 | 2 the.  2 exp. | From 1 to 3of section 10 | ARP | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 21 | 2 the.  2 exp. | From 1 to 3of section 10 | FTP | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 22 | 2 the.  2 exp. | From 1 to 3of section 10 | FTP | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 23 | 2 the.  2 exp. | From 1 to 3of section 10 | Email. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 24 | 2 the.  2 exp. | From 2 to 5of section 10 | Email. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 25 | 2 the.  2 exp. | From 2 to 5of section 10 | Email. | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 26 | 2 the.  2 exp. | From 2 to 5of section 10 | DNS | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 27 | 2 the.  2 exp. | From 2 to 5of section 10 | DNS | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 28 | 2 the.  2 exp. | From 2 to 5of section 10 | DNS | From 1 to12 of section 11 | From 1 to4 of section 12 |
| 29 | 2 the.  2 exp. | From 2 to 5of section 10 | DNS | From 1 to12 of section 11 | From 1 to4 of section 12 |

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| 11. Infrastructure | |
| 1. Books Required reading: | 1. Oliver Heckmann, "THE COMPETITIVE INTERNET SERVICE PROVIDER ", 2006, John Wiley & Sons Ltd. 2. Margaret Levine Young et al, " Internet: The Complete Reference ", 2nd Edition, 2002, McGraw-Hill. 3. Edward Insam, " TCP/IP Embedded Internet Applications ", 1st publish Edition, 2003, Linacre House, Jordan Hill. 4. Huub van Helvoort, " Next Generation SDH/SONET Evolution or Revolution?", 2005, John Wiley & Sons Ltd. 5. Eric A. Hall, " Internet Core Protocols The Definitive Guide", 2000, O'Reilly & Associates, Inc. |
| 2. Main references (sources) | 1. Oliver Heckmann, "THE COMPETITIVE INTERNET SERVICE PROVIDER ", 2006, John Wiley & Sons Ltd. 2. Margaret Levine Young et al, " Internet: The Complete Reference ", 2nd Edition, 2002, McGraw-Hill. |
| A- Recommended books and references (scientific journals, reports…). | **PAPERS**   * + - 1. Pallis, George, and Athena Vakali. "Insight and perspectives for content delivery networks." Communications of the ACM 49.1 (2006): 101-106.‏       2. Bertschek, Irene, Daniel Cerquera, and Gordon J. Klein. "More bits–more bucks? Measuring the impact of broadband internet on firm performance." Information Economics and Policy 25.3 (2013): 190-203.‏       3. Van der Wee, Marlies, et al. "Techno-economic evaluation of open access on FTTH networks." IEEE/OSA Journal of Optical Communications and Networking 7.5 (2015): 433-444.‏ |
| B-Electronic references, Internet  sites… | * Laboratory experiments in the ( Computer network Lab ) of the department.   Available websites related to the subject  Extra lectures by foreign guest lecturers |

12.The development of the curriculum plan

Continuous developing academic curriculum line with the scientific development

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

Computer Architecture II

**COURSE SPECIFICATION**

This course covers the current the advancement in computer architecture including the internal organization of processors , multi-core CPU’s architecture, many-core PU’s architecture, and the memory hierarchy . The learning outcomes that a typical student might reasonably be expected to achieve are based on the three tenets that all computer architects and designers are believed on, namely: parallelism, pipelining and the principle of locality. In doing so, the student takes full advantage of the learning opportunities to participate and contribute to modern research and development that reflects the state-of-the-art as well as the art-of-the-practice in modern computer design and computing in both hardware and software domain..

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| 1. Teaching Institution | College of Engineering  University of Baghdad |
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| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Computer Architecture II / COE 402 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st & 2nd / Academic Year 2018 – 2019 |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  Specification | September – 04 / 2020 |
| 8. Aims of the Course | |
| * Explore the advancement in computer architecture and makes the student ready to design and facilitate the current trends in computer architecture. This involve: * How to determine the performance of computer in both theoretical and practical manner. * Understanding the Moore’s law and its impact on computer engineering. * Understanding the pipelining principle for both static and dynamic pipeline and three hazards encounter in pipeline, namely: Structural hazards, Data hazards, and branch hazards. In addition, the current trends to solve these hazards. Furthermore, how to deal with Interrupt and Exception behavior from the computer architects point of view. * Understanding compiler optimization, loop unrolling, branch prediction. * Understanding ILP, TLP, DLP * Understanding the Advanced Pipelining, involve: super scalar, VLIW, and software pipelining. * Going from unicore to multicore and many core architecture, and discuss the principle of “lazy boy era is finished”. This involve: implicit and explicit threading and processing, fine-grained, coarse grained, and SMT multithreading from hardware point of view and leads to concrete understanding and imagination of the sole of this subject. * Understanding the memory Hierarchy design and Organization, how the cache memory work and the 4C’s principle in Cache memory. | |

9· Learning Outcomes, Teaching , Learning and Assessment Method

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| 1. Cognitive goals:   A1. Write RTL for hardware jobs.  A2. Define and explain the principles of Computer Architecture and the interfacing between its hardware and software components  A3. Understand the data path inside Computer Architecture.  A4. Understand the Computer Architecture organization  A5. Know the organization and architecture of the Internet with an emphasis on the user's view of the computer Network.  A6. An appreciation of the importance of proof, generalization and abstraction in the logical development of formal theories  A7. Understand of architectural blocks involved in computer architecture.  A8. Understand problems of Computer Architecture.  A9. How to apply Engineering analysis (time, cost, performance) in Computer design.  A10. Understand Internet architectures. |
| B. The skills goals special to the course  B1- Mathematical concepts and basic algorithms for describing and solving engineering problems.  B2 - Initial developments in Internet Technology majors.  B3 - developing the ability to conduct experiments and analyze data.  B5- Identifying, formulating and solving Internet Technology problems using modern engineering tools, techniques, and skills,  B6 - cooperation in group projects,  B7 - Developing written and verbal communication skills through presentations from the project results,  B8 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.  Teaching and Learning Methods.  1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Tests and Exams.  5. In-Class Questions and Discussions.  6. Connection between Theory and Application.  7. Seminars.  8. In- and Out-Class oral conservations.  9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year. 4. General and rehabilitative transferred skills(other skills relevant to employability and personal development)   D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

***10. Course Structure***

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| **Assessment Method** | **Teaching**  **Method** | **Unit/Module or Topic Title** | **ILOs** | **Hours** | **Week** |
| Motivation  Quizzes  Test  Home work  Peer assessment  Oral assessment  Discussion on Extra examples | Attract the student to the topics  Guided Discovery  Power Point Lecturing that summarizes the full text, in addition, a full text also available.  Assignment  Seminars  Playing some Videos to stress and improve the student capability  Do some practical examples that integrate the computer engineering subjects by Java programming language.  Group Discussion | **New Trends in Computer Architecture and CPU's Performance Equations** | **A1**  **A2**  **A3**  **A4**  **B1**  **B2**  **B3**  **C1**  **C2**  **C3** | **12** | **1-6** |
| Motivation  Quizzes  Test  Home work  Peer assessment  Oral assessment  Discussion on Extra examples | Attract the student to the topics  Guided Discovery  Power Point Lecturing that summarizes the full text, in addition, a full text also available.  Assignment  Seminars  Playing some Videos to stress and improve the student capability  Do some practical examples that integrate the computer engineering subjects by Java programming language.  Group Discussion | **Static and Dynamic Pipelining** | **A1**  **A2**  **A3**  **A4**  **B1**  **B2**  **B3**  **C1**  **C2**  **C3** | **12** | **7-12** |
| Motivation  Quizzes  Test  Home work  Peer assessment  Oral assessment  Discussion on Extra examples | Attract the student to the topics  Guided Discovery  Power Point Lecturing that summarizes the full text, in addition, a full text also available.  Assignment  Seminars  Playing some Videos to stress and improve the student capability  Do some practical examples that integrate the computer engineering subjects by using Java programming language.  Group Discussion | **Superscalar** | **A1**  **A2**  **A3**  **A4**  **B1**  **B2**  **B3**  **C1**  **C2**  **C3** | **16** | **13-20** |
| Motivation  Quizzes  Test  Home work  Peer assessment  Oral assessment  Discussion on Extra examples | Attract the student to the topics  Guided Discovery  Power Point Lecturing that summarizes the full text, in addition, a full text also available.  Assignment  Seminars  Playing some Videos to stress and improve the student capability  Do some practical examples that integrate the computer engineering subjects by using Java programming language.  Group Discussion | **Branch prediction** | **A1**  **A2**  **A3**  **A4**  **B1**  **B2**  **B3**  **C1**  **C2**  **C3** | **8** | **21-24** |
| Motivation  Quizzes  Test  Home work  Peer assessment  Oral assessment  Discussion on Extra examples | Attract the student to the topics  Guided Discovery  Power Point Lecturing that summarizes the full text, in addition, a full text also available.  Assignment  Seminars  Playing some Videos to stress and improve the student capability  Do some practical examples that integrate the computer engineering subjects by using Java programming language.  Group Discussion | **Memory Hierarchy** | **A1**  **A2**  **A3**  **A4**  **B1**  **B2**  **B3**  **C1**  **C2**  **C3** | **8** | **25-28** |
| Motivation  Quizzes  Test  Home work  Peer assessment  Oral assessment  Discussion on Extra examples | Attract the student to the topics  Guided Discovery  Power Point Lecturing that summarizes the full text, in addition, a full text also available.  Assignment  Seminars  Playing some Videos to stress and improve the student capability  Do some practical examples that integrate the computer engineering subjects by using Java programming language.  Group Discussion | **Overview of Multi-Core, Many-Core Architecture and Parallel Processing** | **A1**  **A2**  **A3**  **A4**  **B1**  **B2**  **B3**  **C1**  **C2**  **C3** | **6** | **29-31** |
| Quizzes  Test  Home work  Peer report  Group report  Mini-project assignment  Oral Discussion  Practical examples  Independent research. | Attract the student to the topics  Guided Discovery  Power Point Lecturing that summarizes the full text, in addition, a full text also available.  Assignment  Seminars  Playing some Videos to stress and improve the student capability  Do some practical examples that integrate the computer engineering subjects by using Java programming language  Group Discussion  Seminars  Do a group based mini project by arranging with Operating System Libratory. | **Review, Seminars, Project Discussion on up-to-date topics in Computer Architecture** | **A1**  **A2**  **A3**  **A4**  **A5**  **A6**  **B1**  **B2**  **B3**  **B4**  **C1**  **C2**  **C3**  **C4**  **C5**  **C6** | **30** | **1-31** |

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| 11. Infrastructure | |
| 1. Books Required reading: | 1. Computer Architecture a Quantitative Approach , Hennessey & Patterson, (3rd, 4th, & 5th editions), Elsevier, (2003 , 2006, & 2012).  2. Computer Organization and Architecture Design for Performance, William Stalling, 9th edition, Pearson, 2013.  3. Computer Organization and Design: The Hardware/Software Interface Patterson & Hennessey, 4th edition, The Morgan Kaufmann Series in Computer Architecture and Design, 2008.  4. Microprocessor Architecture, Jean-Loup Baer, Cambridge University Press, 2010.  5. Structure Computer Organization, Tanenbaum, 5th edition, Prentice Hall,2006.  6. OpenCL Programming by Example, **Banger & Bhattacharyya,** PACKT, 2013.  7. Modern X86 Assembly Language Programming\_ 32-bit, 64-bit, SSE, and AVX, Kusswurm, APRESS, December 2014.  8. The Java Tutorial, 6th Edition, Gallardo et. al., Addison-Wesley Professional, December 2014. |
| 2. Main references (sources) | 1. Computer Architecture a Quantitative Approach , Hennessey & Patterson, (3rd, 4th, & 5th editions), Elsevier, (2003 , 2006, & 2012). |
| A- Recommended books and references (scientific journals, reports…). | Papers:   * P. Trivedi and R. P. Tripathi, "Design & analysis of 16 bit RISC processor using low power pipelining," International Conference on Computing, Communication & Automation, Noida, 2015, pp. 1294-1297. * B. W. Bomar, "Implementation of microprogrammed control in FPGAs," in *IEEE Transactions on Industrial Electronics*, vol. 49, no. 2, pp. 415-422, Apr 2002.   J. L. Cruz, A. Gonzalez, M. Valero and N. P. Topham, "Multiple-banked register file architectures," Proceedings of 27th International Symposium on Computer Architecture (IEEE Cat. No.RS00201), Vancouver, BC, Canada, 2000, pp. 316-325. |
| B-Electronic references, Internet  sites… | Data Show.  Internet.  NetBeans IDE in the Lab.  A Good Sounding system in the Lecture Hall.  E-Learning Platform.  Smart Board. |

12.The development of the curriculum plan

Continuous developing academic curricula in line with the scientific development.

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**Embedded System**

**COURSE SPECIFICATION**

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 programmed specification.

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| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Embedded Systems / COE 403 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st & 2nd / Academic Year 2018 – 2019 |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  Specification | September – 04 / 2020 |
| 8. Aims of the Course | |
| As a brief description for the Goals and objectives, by the completion of the course the goal is:  To provide students with basic knowledge and skills in embedded systems design. | |

9· Learning Outcomes, Teaching , Learning and Assessment Method

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| A1. Design, program and evaluate systems in real time.  A2. Designing electronic circuits for the processing of information in communications and control systems.  A3. The ability to analyze, design, test and maintain complex embedded systems.  A4. The ability to describe, validate and optimize embedded electronic systems in different areas of industrial application.  A5. The ability to evaluate hardware and software requirements for communication and control applications.  A6. The ability to solve industrial problems in control and automation systems.  A7. The ability to write reports on and present the systems designed.  A8. Understanding and applying the properties of sensors for designing electronic systems that integrate measurement and behavior in different areas of industrial production.  A9. Understanding and knowing how to use the methods and tools for the development and refinement of programs implemented on microprocessors, microcontrollers and DSPs.  A10. Understanding the most suitable processing of signaling and the associated hardware. |
| B. The skills goals special to the course  B1- Mathematical concepts and basic algorithms for describing and solving engineering problems.  B2 - Initial developments in Embedded systems majors.  B3 - developing the ability to conduct experiments and analyze data.  B5- Identifying, formulating and solving Internet Technology problems using modern engineering tools, techniques, and skills,  B6 - cooperation in group projects,  B7 - Developing written and verbal communication skills through presentations from the project results,  B8 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.  10. Teaching and Learning Methods.   * + - 1. Lectures.       2. Tutorials.       3. Homework and Assignments.       4. Tests and Exams.       5. In-Class Questions and Discussions       6. Connection between Theory and Application.       7. Seminars.       8. In- and Out-Class oral conservations.   9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| Grading Policy  1. Exams and Quizzes: There will be at least seven closed books and notes exams and quizzes during the academic year.  2. Oral and written assessment: The students are encouraged to participate their ideas to solve the problems during the lecture. The oral and written assessment.  3. Final Exam: - The final exam will be comprehensive, closed books and notes.  C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

***10. Course Structure***

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| weak | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| Week | Hours | LOs | **Topic title** | Teaching method | Assessment  Method |
| 1 | 2 the.  2 exp. | Item 1 of section 10 | **Review of microcontrollers and Digital Signal Processors (DSP), architecture,**  **peripheral modules.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 2 | 2 the.  2 exp. | Item 2 & 3 of section 10 | **Embedded micro controller cores (ARM, RISC, CISC, SOC), addressing modes.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 3 | 2 the.  2 exp. | Item 4 of section 10 | **Interrupts structure, hardware multiplier, pipelining.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 4 | 2 the.  2 exp. | Item 4 of section 10 | **Hardware/Software co-design. Architecture of embedded systems.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 5 | 2 the.  2 exp. | Item 1 to 4 of section 10 | **Tutorials & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 6 | 2 the.  2 exp. | Item 5 of section 10 | **Assemblers, linkers and loaders. Binary file formats for processor executable files.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 7 | 2 the.  2 exp. | Item 5 of section 10 | **Typical structure of timer-interrupt driven programs.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 8 | 2 the.  2 exp. | Item 5 of section 10 | **GNU-GCC compiler introduction, programming with Linux environment and gnu debugging.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 9 | 2 the.  2 exp. | Item 5 of section 10 | **GNU insight with step level trace debugging, make file interaction, building and execution.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 10 | 2 the.  2 exp. | Item 6 of section 10 | **Introduction to ARM instruction set, addressing modes, operating modes with**  **ARM core.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 11 | 2 the.  2 exp. | Item 6 of section 10 | **ARM TDMI modes, ADC, Timers, Interrupt structure.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 12 | 2 the.  2 exp. | Item 7 of section 10 | **Byte ordering (LE, BE), Thumb mode normal mode instructions changes.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 13 | 2 the.  2 exp. | Item 7 of section 10 | **Pipeline utilization with all register allocations.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 14 | 2 the.  2 exp. | Item 7 of section 10 | **Compare the ARM7, ARM9, and ARM11 with new features additions. System design with ARM processor.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 15 | 2 the.  2 exp. | Item 8 of section 10 | **Interfacing switches, keyboards, LED’s and LCD’s.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 16 | 2 the.  2 exp. | Item 8 of section 10 | **Transistors used for digital-controlled switches, digital-controlled relays, solenoids & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 17 | 2 the.  2 exp. | Item 8 of section 10 | **Interfacing of DC, AC and**  **stepper motors.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 18 | 2 the.  2 exp. | Item 8 of section 10 | **Analog interfacing and data acquisition systems.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 19 | 2 the.  2 exp. | Item 9 of section 10 | **Real Time Operating System Concepts, Kernel Structure.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 20 | 2 the.  2 exp. | Item 9 of section 10 | **Critical Sections,**  **Multitasking, Task Management.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 21 | 2 the.  2 exp. | Item 9 of section 10 | **Time Management, Schedulers, Event Control** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 22 | 2 the.  2 exp. | Item 9 of section 10 | **Blocks, Priorities, Deadlocks.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 23 | 2 the.  2 exp. | From 5 to 8 of section 10 | **Tutorial & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 24 | 2 the.  2 exp. | Item 9 of section 10 | **Synchronization, Semaphore Management, Mutual**  **Exclusion.** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 25 | 2 the.  2 exp. | Item 9 of section 10 | **Message Mailbox Management, Message Queue Management, Memory Management** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 26 | 2 the.  2 exp. | Item 9 of section 10 | **Tutorial & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 27 | 2 the.  2 exp. | Item 10 of section 10 | **Applications of Embedded Systems** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 28 | 2 the.  2 exp. | Item 10 of section 10 | **Applications of Embedded Systems** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 29 | 2 the.  2 exp. | Item 10 of section 10 | **Applications of Embedded Systems** | From 1 to12 of section 11 | From 1 to 4 of section 12 |
| 30 | 2 the.  2 exp. | From 1 to 10 of section 10 | **Tutorial & Quiz** | From 1 to12 of section 11 | From 1 to 4 of section 12 |

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| 11. Infrastructure | |
| Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | 1. Embedded / Real-Time Systems: Concepts, Design & Programming - Dr. K.V. K. K. Prasad – dream tech Press, India. 2. An Embedded Software Primer - David E. Simon - Pearson Education South Asia. 3. Embedded Systems, Architecture, Programming and Design - Raj Kamal -Tata McGraw Hill. 4. Embedded Realtime Systems Programming - Sriram V Iyer, Pankaj Gupta - Tata McGraw Hill. 5. ARM System Developer’s Guide Designing and Optimizing System Software - Andrew N. Sloss, Dominic Sysmes and Chris Wright - Elsevier Inc. |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | **Papers**   1. S. Edwards, L. Lavagno, E. A. Lee and A. Sangiovanni-Vincentelli, "Design of embedded systems: formal models, validation, and synthesis," in Proceedings of the IEEE, vol. 85, no. 3, pp. 366-390, March 1997. 2. Daler Rakhmatov and Sarma Vrudhula. 2003. Energy management for battery-powered embedded systems. ACM Trans. Embed. Comput. Syst. 2, 3 (August 2003), 277-324. |
| B-Electronic references, Internet  sites… |  |

1. The development of the curriculum plan

Continuous developing academic curricula in line with the scientific development

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**Computer Security**

**COURSE SPECIFICATION**

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 programmed specification.

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| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Computer Security /COE 404 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st & 2nd / Academic Year 2018 – 2019 |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  Specification | September – 04 / 2020 |
| 8. Aims of the Course | |
| 1. Being aware of most security aspects and thoughts.  2. Exploring the most famous algorithms of Security systems  3- Learning the main parameters required for Security system design. | |

9· Learning Outcomes, Teaching , Learning and Assessment Method

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| The knowledge and skills expected to be attained by the student upon completion of the course are listed below:  A. Knowledge and Understanding:  A1. Understanding and dealing with OSI security architecture.  A2. Design and analyze a basic model of classical encryption techniques.  A3. Evaluate the security models  A4. Diagnose the main weak point in security systems.  A5. Analyze an advanced encryption techniques. |
| B1. encryption system design  B2. ability to analyze a basic model of classical encryption techniques.  C. Thinking Skills  C1. thinking of secure communication and jobs.  C2. discover new encryption techniques  D. Personal Development  D1. become secure person.  D2. determine optimal secure model.  10. Teaching and Learning Methods.  1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Tests and Exams.  5. In-Class Questions and Discussions  6. Connection between Theory and Application.  7. Seminars.  8. In- and Out-Class oral conservations.  9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

***10. Course Structure***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| weak | Hours | ILOs | Topic title | Teaching method | Assessment  Method |
| week | Hours | Los | **Topic title** | Teaching method | Assessment  Method |
| 1 | 3 the. | From A1-A5 | **Introduction to Security Trends, OSI Architecture** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 2 | 3 the. | From A1-A5 | **A Model of network security** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 3 | 3 the. | From A1-A5 | **Classical Encryption techniques** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 4 | 3 the. | From A1-A5 | **Symmetric Key Cryptography** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 5 | 3 the. | From A1-A5 | **DES** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 6 | 3 the. | From A1-A5 | **DES** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 7 | 3 the. | From A1-A5 | **Finite Field** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 8 | 3 the. | From A1-A5 | **AES** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 9 | 3 the. | From A1-A5 | **Modes of Operation** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 10 | 3 the. | From A1-A5 | **Message Authentication** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 11 | 3 the. | From A1-A5 | **Public Key Cryptography** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 12 | 3 the. | From A1-A5 | **Public Key Cryptography** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 13 | 3 the. | From A1-A5 | **Digital Signature** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 14 | 3 the. | From A1-A5 | **User Authentication** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 15 | 3 the. | From A1-A5 | **User Authentication** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 16 | 3 the. | From A1-A5 | **Access Control** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 17 | 3 the. | From A1-A5 | **Access Control** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 18 | 3 the. | From A1-A5 | **Malware** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 19 | 3 the. | From A1-A5 | **Malware** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 20 | 3, the. | From A1-A5 | **Denial of Service Attacks** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 21 | S3 the. | From A1-A5 | **Denial of Service Attacks** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 22 | 3 the. | From A1-A5 | **Firewall** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 23 | 3 the. | From A1-A5 | **Firewall** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 24 | 3 the. | From A1-A5 | **Intrusion Detection System** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 25 | 3 the. | From A1-A5 | **Trusted Computing** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 26 | 3 the. | From A1-A5 | **Trusted Computing** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 27 | 3 the. | From A1-A5 | **Web Security** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 28 | 3 the. | From A1-A5 | **Web Security** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 29 | 3 the. | From A1-A5 | **Internet Security** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |
| 30 | 3 the. | From A1-A5 | **Internet Security** | From 1 to12 of  T-Methods | From 1 to4 of  A-Methods |

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| 11. Infrastructure | |
| Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | * Computer Security, 3rd edition, William stalling, 2015. * Cryptography and Network Security, 7th edition , William stalling, 2017. * Applied Cryptography, 2nd edition, Bruce Schneier, 1996. |
| 2. Main references (sources) |  |
| A- Recommended books and references (scientific journals, reports…). | * paper1: van der Veen, V.; dutt-Sharma, N.; Cavallaro, L., and Bos, H. “Memory errors: the past, the present, and the future.” in Proceedings of the 15th international conference on Research in Attacks, Intrusions, and Defenses (RAID’12), Springer-Verlag, pp. 86–106, 2012 * Paper2: Felten, E. “Understanding Trusted Computing: Will Its Benefits Outweigh its Drawbacks?” *IEEE Security and Privacy*, May/June 2003. * Paper3: Cheng, T., et al. “Evasion Techniques: Sneaking through Your Intrusion Detection/Prevention Systems.” *IEEE Communications Surveys &Tutorials,* Fourth Quarter 2012. |
| B-Electronic references, Internet  sites… |  |

12.The development of the curriculum plan

Continuous developing academic curricula in line with the scientific development

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

Artificial Intelligent and Robotics

**COURSE SPECIFICATION**

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 programmed specification.

|  |  |
| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Artificial Intelligent and Robotics \COE 405 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st & 2nd / Academic Year 2018 – 2019 |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  Specification | September – 04 / 2020 |
| 1. Aims of the Course 2. This subject has been prepared as a comprehensive for a first study of control engineering. 3. also helps the students to understand the artificial intelligent and robotics system for variety of engineering applications 4. covers the artificial intelligent and robotics system | |

9· Learning Outcomes, Teaching , Learning and Assessment Method

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| 1. Knowledge and Understanding   A1.- Learn the basic fundamentals of Artificial Intelligent  In the ﬁeld, which encompasses logic, probability, and continuous mathematics; perception, reasoning, learning, and action; and everything from microelectronic devices to robotic explorers.  A2.L Deﬁne AI as the study of agents that receive percepts from the environment and perform actions  A3. We explain the role of learning as extending the reach of the designer into unknown environments.  A4.Learn the Robotics system  A5. Learn the kinematics of Robotics  A6 . Learn the path planning of robotics |
| B1. Understand the AI theory  B2. Find the learning algorithms  B3: study the Artificial neural networks  B4.How to compute all the learning algorithms  B5.Compute the path planning of robotics based on AI C. Thinking Skills  10. Teaching and Learning Methods.  1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Tests and Exams.  5. In-Class Questions and Discussions  6. Connection between Theory and Application.  7. Seminars.  8. In- and Out-Class oral conservations.  9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

***10. Course Structure***

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| --- | --- | --- | --- | --- | --- |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Introduction**  **What Is AI?**  **The Foundations of Artiﬁcial Intelligence**  **The History of Artiﬁcial Intelligence**  **The State of the Art** | A1 | 2 theory  1 tutorial | 1-2 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Intelligent Agents**  **Agents and Environments.**  **Good Behavior: The Concept of Rationality.**  **The Nature of Environments.**  **The Structure of Agents** | A2 | 2 theory  1 tutorial | 3-4 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Learning**  **Learning from Examples**  **Forms of Learning .** | A2 | 2 theory  1 tutorial | 5 |
| From 1 to3 of Assessment Method | From 1 to 8 of Teaching and Learning Methods | **Supervised Learning**  **Learning Decision Trees**  **Evaluating and Choosing the Best Hypothesis.** | A1, A2 | 2 theory  1 tutorial | 6 |
| From 1 to3 of Assessment Method | From 1 to 8 of Teaching and Learning Methods | **The Theory of Learning**  **Regression and Classiﬁcation with Linear Models.** | A3 | 2 theory  1 tutorial | 7 |
| From 1 to3 of Assessment Method | From 1 to 8 of Teaching and Learning Methods | **Artiﬁcial Neural Networks**  **Nonparametric Models** | A4, A5 | 2 theory  1 tutorial | 8-10 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Support Vector Machines**  **Ensemble Learning** | A6 | 2 theory  1 tutorial | 11-14 |
| From 1 to3 of Assessment Method | From 1 to 8 of Teaching and Learning Methods | **Practical Machine Learning** | A6 | 2 theory  1 tutorial  2 labs. | 15-18 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Learning Probabilistic Models** | A5,A6 | 2 theory  1 tutorial | 19 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Reinforcement Learning** | A1 | 2 theory  1 tutorial | 20 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Robotics Introduction** | A1 | 2 theory  1 tutorial | 21 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Robot Hardware** | A1 | 2 theory  1 tutorial | 22 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Robotic Perception** | A5 | 2 theory  1 tutorial | 23 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Planning to Move** | A1,A5 | 2 theory  1 tutorial | 24 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Planning Uncertain Movements** | A1,A5 | 2 theory  1 tutorial | 25 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Moving** | A1,A5 | 2 theory  1 tutorial | 26-28 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Robotic Software Architectures** | A1,A5 | 2 theory  1 tutorial | 26-28 |
| From 1 to3 of Assessment Method | From 1 to8 of Teaching and Learning Methods | **Application Domain** | A1,A5 | 2 theory  1 tutorial | 29-30 |

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| 11. Infrastructure | |
| Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | 1. **Stuart J. Russell and Peter Norvig “Artiﬁcial Intelligence: A Modern Approach”, 2010 by Pearson Education, Inc., Third Edition.** 2. **M.W.Spong , S. Hutchinson and M. Vidyasagar, “Robot Modeling and Control”, 2006.** 3. **Kevin M. Lynch and Frank C. Park, “Modern Robotics Mechanics, Planning, And Control”, 2017.** |
| 2. Main references (sources) | **JACEK M. ZURADA, “Introduction to Artificial Neural Systems” , 1992.** |
| A- Recommended books and references (scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |

1. The development of the curriculum plan

Continuous developing academic curricula in line with the scientific development

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

Computer Vision and Pattern Recognition

**COURSE SPECIFICATION**

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 programmed specification.

|  |  |
| --- | --- |
| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Computer Engineering Department (COED) |
| 3. Course title/code | Computer Vision and Pattern Recognition / COE 406 |
| 4. Modes of Attendance offered | Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. |
| 5. Semester/Year | 1st & 2nd / Academic Year 2018 – 2019 |
| 6. Number of hours tuition (total) | 60 hrs. / 2 hrs. per week Theory.  60 hrs. / 2 hrs. per week Lab. |
| 7. Date of production/revision of this  Specification | September – 04 / 2020 |
| 1. **Aims of the Course**   What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)?   1. Present, as clearly and completely as possible, the main principles of modern computer vision systems equipped with pattern recognition capabilities. 2. Provide a thorough discussion of the fundamentals of computer vision basic algorithms and with emphasis to the analysis and implementation of certain algorithms from the literature. 3. The course mainly will study: relation between computer vision and human vision system, color spaces and their relations, multi-level features, feature extraction and matching, optical flow, machine learning, and object detection. | |

9· Learning Outcomes, Teaching , Learning and Assessment Method

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| A. Knowledge and Understanding:   1. Analyze scientific research and describe computer vision and pattern recognition/classification algorithms. 2. Acquire data from a camera source. 3. Process the acquired image/video data. 4. Extract discriminative features from the image/video data. 5. Apply pattern recognition/classification algorithms in order to distinguish different patterns. 6. Build a full computer vision system. 7. Analyze the performance of a full computer vision system.   B. Subject-specific skills   1. Realizing the relationship between computer vision and human visual system. 2. Understanding computer vision and pattern recognition algorithms. 3. Design and modeling a computer vision and pattern recognition algorithm.   C. Thinking Skills   1. Understanding the relationship between computer vision algorithm and human visual system. 2. Understanding features including feature extraction and feature matching 3. Understanding visual classification, tracking, and retrievals.   D. General and Transferable Skills (other skills relevant to employability and personal development)   1. Thinking of computer vision system as a system that is used to replace human visual system in computer system. 2. Help students to design and build their computer vision algorithms. 3. Design a computer vision and pattern recognition algorithm for embedded systems. 4. Developing computer vision algorithms.   Design and develop algorithms for controlling devices interfaced to visual devices. |
| Teaching and Learning Methods.  1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Tests and Exams.  5. In-Class Questions and Discussions  6. Connection between Theory and Application.  7. Seminars.  8. In- and Out-Class oral conservations.  9. Reports, Presentations, and Posters. |
| Assessment Methods  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). |
| Grading Policy  1. Exams and Quizzes: There will be at least seven closed books and notes exams and quizzes during the academic year.  2. Oral and written assessment: The students are encouraged to participate their ideas to solve the problems during the lecture. The oral and written assessment.  3. Final Exam: - The final exam will be comprehensive, closed books and notes.  C. Affective and value goals  C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.  Teaching and Learning Methods  1-Tests, quizzes.  2- Activities.  3- Participate during lectures  Assessment methods   1. Study the conditions of former graduates. 2. Relevant committees in management such as scientific, QA. 3. The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.   D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1. Ability to carry out Independent study to take notes, to carry out background reading.  D2. Problem Solving based on understanding.  D3. Ability to learn and remember key facts  D4. Self-discipline and self-motivation |

***10. Course Structure***

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| Week | Hours | Los | **Topic title** | Teaching method | Assessment  Method |
| 1 | 2 the.  1 tut. | Item A1 | **Introduction to Computer Vision and Pattern Recognition.** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 2-3 | 4 the.  2 tut. | Items A1 | **Human Vision, Color Spaces and Transforms** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 3-4 | 4 the.  2 tut. | Item A2 | **Image coordinates and resizing** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 5-8 | 6 the.  3 tut. | Item A3 | **Filters and convolutions** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 9-10 | 4 the.  2 tut. | Item A3 | [**Harris detector and matching**](https://docs.google.com/presentation/d/1GLPcw-hQB1D94mOzTZKdMwAa8NKuqgih-bWl1vJS0tE/edit?usp=sharing) | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 11-13 | 6 the.  3 tut. | Item A4 | [**Matching, RANSAC, HOG, and SIFT**](https://docs.google.com/presentation/d/1h2Az_a28qjKvLpbkwXoW0eut9HTwmjTkjCtk876PYN8/edit?usp=sharing) | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 13-14 | 4 the.  2 tut. | Item A4 | **Optical Flow** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 15 | 2 the.  1 tut. | Item A5 | [**Machine Learning**](https://docs.google.com/presentation/d/1QgvrxpjVJLcYPWPVm9gXvqLjQth4um1nJpc0R00SNpg/edit?usp=sharing) | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 16 | 2 the.  1 tut. | Item A5 | [**Machine Learning for Computer Vision**](https://docs.google.com/presentation/d/1sU-rMMkWXMuQYhjJkhPFAD7VifZnxXMBxOfevdwOOKU/edit?usp=sharing) | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 17-18 | 4 the.  2 tut. | Item A4-A5 | **Feature extraction** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 19-20 | 4 the.  2 tut. | Item A5 | [**Neural Networks**](https://docs.google.com/presentation/d/1NLdRUsxH30tSNe46OOd3rPa-xoKFkDR-fYH8rnh0POo/edit?usp=sharing) | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 21-22 | 4 the.  2 tut. | Item A5 | **Support Vector Machine** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 23 | 2 the.  1 tut. | Item A5 | **Introduction to** [**Convolutional Neural Networks**](https://docs.google.com/presentation/d/1LwTvykcPzDoAzQyAZB4cbP5Lh_czqfBAMGnBddVHbxs/edit?usp=sharing) | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 24-25 | 4 the.  2 tut. | Item A5 | [**Object Detection**](https://docs.google.com/presentation/d/1O3JfanUU7ey7D4FCtb_eF7w0l8MMmrg4L0vqSjVix_c/edit?usp=sharing) | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 26-27 | 4 the.  2 tut. | Item A4-A5 | **Segmentation** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 27-28 | 4 the.  2 tut. | Item A6 | **Face detection and recognition** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |
| 29-30 | 4 the.  2 tut. | Item A6-A7 | **Seminars** | From 1 to 10 of  T-methods | From 1 to 4 of  A-methods |

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| 11. Infrastructure | |
| Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | ***References:***   1. Feature extraction image processing for computer vision, Nixon, Mark S and Aguado, Alberto S, 2012, Academic Press. 2. Color image processing: methods and applications, Lukac, Rastislav and Plataniotis, Konstantinos N, 2006, CRC press. |
| 2. Main references (sources) | Computer Vision: Algorithms and Applications Rick Szeliski, 2010. |
| A- Recommended books and references (scientific journals, reports…). | ***Papers***:   1. Abdulhussain, Sadiq H. and Ramli, Abd Rahman and Mahmmod, Bahseera M and Al-Haddad, S A R and Jassim, Wissam A. “Image Edge Detection Operators based on Orthogonal Polynomials.” International Journal of Image and Data Fusion 8.3 (2017), 293-308. 2. Mahmmod, Basheera M. and bin Ramli, Abd Rahman and Abdulhussain, Sadiq H and Al-Haddad, Syed Abdul Rahman and Jassim, Wissam A. “Signal compression and enhancement using a new orthogonal-polynomial-based discrete transform.” IET Signal Processing 12.1(2018): 129-142. 3. Lowe, David G. "Distinctive image features from scale-invariant keypoints." International journal of computer vision 60.2 (2004): 91-110. |
| B-Electronic references, Internet  sites… | DataShow.  Internet.  A Good Sounding system in the Lecture Hall.  SmartBoard |

1. The development of the curriculum plan

Continuous developing academic curricula in line with the scientific development