**Course description form**

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| 1. **Course Name** |
| Measurement & Instruments |
| 1. **Course Code** |
| **EP303** |
| 1. **Semester/Year** |
| 1st Semester/Third Year |
| 1. **The date this description was prepared** |
| / 9 / 202325 |
| 1. **Available forms of attendance** |
| Face-to-Face theoretical lectures |
| 1. **Number of study hours (total) / number of units (total)** |
| 30/2 |
| 1. **Name of the course administrator** |
| Name: Assist. Lect. Mounir Thamer Ismaiel  Email:[moneerthameer\_enge@uodiyala.edu.iq](mailto:moneerthameer_enge@uodiyala.edu.iq) |

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| 8. Aims of the Course |
| The subject of control aims to teach the student the mathematical representation of the control system, analysis of linear control circuits, and teach the student how to build an electrical and mechanical model for the derived equations, transfer functions, and analysis of the frequency field of the control system, in addition to teaching the student about the stability of systems. The goal we seek in teaching this subject is to consolidate the principles and foundations. The theory that is used to create and understand absolutely any electronic electrical circuit. |

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| 9· Learning Outcomes, Teaching ,Learning and Assessment Method |
| A- Cognitive goals.  A1- During the school year, the student learns an idea about the types of systems, whether they are open or equipped with inverse return.  A2- Learn and understand the phase diagram and its reduction.  A3- Learn and understand the Laplace transform and its inverse review.  A4- Learn and understand the foundations of the Roth-Hurwitz stability criterion. |
| B. The skills goals special to the course.  B1 - Familiarity with the mathematical relationships present within the subject.  B2- Familiarity with all types of systems.  B3- Familiarity with how to carry out practical experiments related to the subject.  B4- Familiarity with the basic concepts of stability methods, their types and practical applications. |
| Teaching and Learning Methods |
| * The lecturer delivers detailed theoretical lectures * The lecturer requests periodic reports on the basic topics of the subject. |
| Assessment methods |
| * Daily exams with practical and scientific questions. * Participation marks for difficult competition questions among students. * Assigning grades to homework assignments and reports assigned to them. * Semester exams for the curriculum, in addition to the mid-year exam and final exam. |
| C. Affective and value goals  C1- Urging the student to think about finding models for systems, whether mechanical or electrical.  C2- Urging the student to think about the importance of finding and analyzing the frequency field of the control system.  C2- Urging the student to think about the factors affecting the stability of systems.  C4- Urging the student to think about choosing the appropriate components and contributing to the process of designing transmitter and receiver circuits for electromagnetic waves. |
| Teaching and Learning Methods |
| * The lecturer delivers detailed theoretical lectures. * The lecturer is familiar with the basic concepts of the components of practical control systems, which enhances the method of learning and teaching. * The lecturer introduces students to the most important components in designing various communications systems, theoretically and practically. |
| Assessment methods |
| * Daily exams with practical and scientific questions. * Participation marks for difficult competition questions among students. * Assigning grades to homework assignments and reports assigned to them. * Semester exams for the curriculum, in addition to the mid-year exam and final exam. |

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| D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1- Enabling students to write reports on topics related to the subject of control.  D2- Enabling students to link theories with the practical reality of electrical circuits.  D3- Enabling students to pass professional tests organized by local or international bodies.  D4- Enabling students to continue self-development after graduation.  D5- Establishing special seminars for students for the purpose of self-development of their personalities. |

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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or Topic Title | Teaching Method | Assessment Method |
| Week 1 | 2 | An introduction to the subject of instruments and measurements, with a historical overview of it | International system of units , Systems of Units and Standards of Measurement, Systems of units | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 2 | 2 | Work in the field of time and frequency for electrical devices | electrical standard, time and frequency standards, IEEE standards Small Signal Diode Model  Other Diode types: | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 3 to Week 4 | 4 | An explanation of the general characteristics of measuring devices | Definitions, accuracy, precision, resolution, composition of measuring system selection factors and trends | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 5 | 2 | Errors associated with the measurement process | Measurement and Error | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 6 | 2 | Types of errors associated with the measurement process, their causes, and methods of dealing with them | types of error: gross, systematic, random, and limiting errors | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 7 to Week 8 | 4 | Statistical analysis of data extracted from electrical measuring devices | Statistical Analysis of Data, Instruments for Measuring Basic Electrical Parameters | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 9 | 2 | Electric bridge and methods of using it in measurements | Bridges and their Applications | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 10 | 2 | Osloscope device, its origin and method of use | Oscilloscopes | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 11 | 2 | An explanation of the types of sensors for location, pressure, speed, acceleration, etc | Transducers: Position, pressure, velocity, acceleration, force, torque, temperature, Photosensitive transducers | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 12 | 2 | Data recording devices | Data Recording Instruments | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 14 | 2 | Noise and ways to treat and reduce it | Noise: Limits to sensitivity, accuracy & speed in both analog and digital systems. | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 14 | 2 | Noise and ways to treat and reduce it | S/N enhancement techniques | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |
| Week 15 | 2 | Computer-based instrumentation and measurements | Computer-based Instrumentation and Measurement | Presented in power point format | Daily exams + practical experiments + monthly exams  Daily exams + practical experiments + monthly exams |

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| 11. Infrastructure | | |
| 1. Books Required reading: | | 1. Alan S Morris,2001, Measurement and  Instrumentation Principles third Edition  2-Dominique Placko, 2007 , Fundamentals of Instrumentation and Measurement, ISTE Ltd |
| 2. Main references (sources) | | • College library to obtain additional sources for the curriculum.  • Check scientific websites to see recent developments in the subject. |
| A- Recommended books and references (scientific journals, reports…). | | * All solid scientific journals that are related to the broad concept of the subject of control. |
| B-Electronic references, Internet sites… | | Prithwiraj Purkait , 2013, Budhaditya Biswas , Santanu Das , Electrical and Electronics Measurements and Instrumentation, McGraw Hill Education |
| 12. The development of the curriculum plan | |
| Updating publications curricula in high-ranking universities and increasing their requirements. | |