**Course description form**

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| 1. **Course Name**
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| **Control Theory II** |
| 1. **Course Code**
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| EP311 |
| 1. **Semester/Year**
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| Fall Semester/Third Year |
| 1. **The date this description was prepared**
 |
| 17 / 9 / 2023 |
| 1. **Available forms of attendance**
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| Face-to-Face theoretical lectures |
| 1. **Number of study hours (total) / number of units (total)**
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| 60/3 |
| 1. **Name of the course administrator**
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| Name: Assist. Prof. Dr. Zeyad A. ObaidEmail: Zeyad.a.obaid@uodiyala.edu.iq  |
| 1. **Course objectives**
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| 1. After completing an understanding of the methods for extracting the final differential equation for several types of systems, the goal will be to move on to using these equations for the purpose of analyzing their stability.2. Studying theories of inductivity testing for time-response systems.3. Design appropriate controllers to improve the response of time systems.4. Understanding the theories of stability testing of frequency response systems and how to treat them.5. A general introduction to the most complex systems and methods of modern computer-based control systems. | **Objectives of the study subject** |
| 1. **Teaching and learning strategies**
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|  Weekly lectures included providing students with the basics and topics related to the pre-skills education outcomes to solve practical problems through presentation, lecture, or conducting experiments. Solve a group of practical and applied examples by faculty members. Through discussion, students participate in solving some practical problems. Practical laboratories in the department are monitored by faculty members in the department. Asking the student to visit the library and the international information network (the Internet) to obtain additional knowledge of academic subjects.Giving a seminar to the student in front of his fellow students to enhance his self-confidence. | **The Strategy** |
| 1. **Course structure**
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| **Evaluation method** | **Learning method** | **Required learning outcomes** | **Name of the unit or topic**  | **Hours** | **Week** |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | A general introduction to systems and the concept of stability in systems | The basic principle of stability | 4 | 1 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Study of the theory of stability testing for time-response systems | Routh Criterion theorem  | 4 | 2 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Study of the theory of stability testing based on root locations | Root Locus Stability Theorem(Part 1) | 4 | 3 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Solutions to examples of the theory of stability testing and knowing the stability of the system through the locations of the roots | Root Locus Stability Theorem(Part 2) | 4 | 4 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | First month exam | An in-person theoretical exam with a practical exam in the laboratory separate from the theoretical one | 4 | 5 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Designing controllers in time-response control systems using various types for the purpose of improving response | Design of time-response control system | 4 | 6 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Study of compensations in the design of control systems for the purpose of improving frequency response performance | Compensators | 4 | 7 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Real examples of electrical power systems that include the types of controllers studied | Real industrial examples | 4 | 8 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Second month exam | An in-person theoretical exam with a practical exam in the laboratory separate from the theoretical one | 4 | 9 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Study of frequency response systems analysis of systems | Frequency Response analysis | 4 | 10 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | A theory for examining the stability of systems and a method for extracting test results using semi-log paper | Bode Plot stability analysis(exact method) | 4 | 11 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | A theoretical method for the purpose of extracting examination results that are approximate | Bode Plot stability analysis(approximate method) | 4 | 12 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | A general introduction to the most complex modern control methods that are computer-based and the extent of their availability in electrical power systems | General introduction for the advanced computer-based control systems | 4 | 13 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Third month exam | An in-person theoretical exam with a practical exam in the laboratory separate from the theoretical one | 4 | 14 |
| Daily examsseminarMonthly exams | LecturesExamples of field practical cases | Discussing the course outcomes for each student and identifying weak points by comparing answers in exams, general assignments, and the laboratory | General discussion for the course output for each student to compare the grades and outcomes of both class and lab exams. | 4 | 15 |
| 1. **Course Evaluation**
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| Distribution of the grade out of 100 according to the tasks assigned to the student, such as daily preparation, daily, oral, monthly, written exams, reports, etc. |
| 1. **Learning and teaching resources**
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| Modern control system by “OGATA.Advanced control system by ’ROLAND S.BURNS” | Required textbooks (methodology, if any) |
| Modern control system by “OGATA.Advanced control system by ’ROLAND S.BURNS” | Main references (sources) |
| YouTube Channel for the Lecturer | Recommended supporting books and references (scientific journals, reports....) |
| Search by keywords:Control theory, Root locus, bode plot, control design, PID controller | Electronic references, Internet sites |