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| 1. **Basic Information** | | | | | |
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| **Code** | **Course Title** | | | | **Bylaw** |
| **EEI 120** | **Control System Components**  **مكونات نظم تحكم** | | | | 2011 |
| **Program** | Electrical Engineering and Computers Engineering BSc. | | | **Category** | Core Course  (Mandatory) |
| **Delivered by** | Electrical Engineering and Computers Engineering Dept. | | | **Prerequisite** | - |
| **Course Units** | **Lectures** | 2 | **hr.** | **Stage** | Diploma |
| **Tutorials** | 2 | **hr.** | **Level** | 02 Elec. |
| **Practical** | - | **hr.** | **Semester** | 1st. Semester |
| **Total Units** | 3 | **Cr. h.** | **Academic Year** | 2022/2023 |
| **Approval Date** | **Program** | **Academic council** | | No. (46) 19/9/2022 | |
| **Dept. council** | | 5/9/2022 | |
| **Course** | **Academic council** | | No. (46) 19/9/2022 | |
| **Dept. council** | | 5/9/2022 | |

| 1. **Course Aims** |
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| **The aim of this course to:**   * Knowopen and close loop systems and transfer function. * Understand operational amplifier operation and circuits. * Analyze electrical circuits under transient conditions. * Realize the state and output differential equations. * Use Matlab/Simulink program for circuit and control systems analysis. |

| 1. **Course Subject Area** | | | | | | | |
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| **A** | **B** | **C** | **D** | **E** | **F** | **G** | **Total** |
| **Humanities and Social Sciences** | **Mathematics and Basic Sciences** | **Basic Engineering Sciences** | **Applied Engineering and Design** | **Computer Applications and ICT** | **Projects and Practice** | **Discretionary Subjects** |
| - | - | - | 100 % | - | - | - | **100 %** |

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| 1. **Competencies of Learning Outcomes from the Course** | | | |
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| **Program competencies that the course contributes in achieving it** | | **Course competencies in detail** | |
| A5 | Practice research techniques and methods of investigation as an inherent part of learning, as appropriate to the EECE discipline. | a5.1 | Identify the elementary science underlying operational amplifier realization, analysis of electrical circuits under transient conditions, state and output differential equations. |
| A8 | Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | a8.1 | Cooperate with engineering community and industry via exchange knowledge and skills related to operational amplifier applications, MATLAB/Simulink program application on circuit analysis and control systems. |
| a8.2 | Compile proper technical reports and present them orally or in written forms to illustrate information related to operational amplifier realization, analysis of electrical circuits under transient conditions, state and output differential equations. |
| B2 | Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design. | b2.1 | Devise specialized engineering designs and/or re-design a process, component or system using operational amplifier and/or MATLAB/Simulink program. |
| b2.2 | Use numerical modeling methods and/or appropriate computational techniques to solve problems related to operational amplifier circuits, analysis of electrical circuits under transient conditions, state and output differential equations. |
| b2.3 | Utilize MATLAB/Simulink program for the design and diagnostics of different electrical circuits under transient conditions and control systems. |
| B4 | Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application. | b4.1 | Use relevant laboratory equipment and analyze the results correctly to verify operational amplifier circuits, analysis of electrical circuits under transient conditions, state and output differential equations. |
| b4.2 | Employ the appropriate specifications for control systems. |
| C1 | Basics of design and analyzing electrical and computer engineering systems, while considering the constraints of applying inappropriate technology and the needs of commercial risk evaluation. | c1.1 | Evaluate the performance of operational amplifier circuits, electrical circuits under transient conditions, and control systems. |
| c1.2 | Evaluate, organize and utilize information and knowledge from different sources to construct a proper design or solution for control systems. |
| c1.3 | Identify principles of analyzing and designing of operational amplifier circuits and control systems, while considering the constraints of applying inappropriate technology and the needs of commercial risk evaluation. |

| 1. **Course Content** |
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| Operational amplifier realization - Analysis of Electrical circuits under transient conditions. State and output differential equations - Matlab/Simulink Program Fundamentals and its application on circuit analysis and control systems. |

| 1. **Course Topics / Timeline** | | |
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| **Topic** | | **No. of Weeks** |
| Topic (1) | Operational amplifier realization | Weeks (1-4) |
| Topic (2) | Analysis of Electrical circuits under transient conditions. | Weeks (5-6) |
| Topic (3) | State and output differential equations | Weeks (7-10) |
| Topic (4) | Matlab/Simulink Program Fundamentals and its application on circuit analysis and control systems. | Weeks (11-12) |

| 1. **Course Topics / Competencies** | | | | |
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| **Competencies** | **Course Topics** | | | |
| **Topic (1)** | **Topic (2)** | **Topic (3)** | **Topic (4)** |
| a5.1 | X | X | X | X |
| a8.1 |  |  | X | X |
| a8.2 |  |  | X | X |
| b2.1 | X | X |  |  |
| b2.2 |  |  | X | X |
| b2.3 | X | X |  |  |
| b4.1 |  |  | X | X |
| b4.2 | X | X |  |  |
| c1.1 |  |  | X | X |
| c1.2 |  |  | X | X |
| c1.3 | X | X |  |  |

| 1. **Teaching and Learning Methods** | | | | | | | | | | | | | |
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| **Competencies** | **Teaching and Learning Methods** | | | | | | | | | | | | |
| **Lecture** | **Presentations** | **Discussions** | **Tutorials** | **Lab experiments** | **Problem solving** | **Brain storming** | **Projects** | **Site visits and scientific trips** | **Reporting** | **Group working** | **Self-reading** | **Distance Learning** |
| a5.1 | X | X |  | X |  |  |  |  |  | X |  | X | X |
| a8.1 | X | X | X | X |  |  | X |  |  | X | X | X | X |
| a8.2 | X | X | X | X |  |  | X |  |  | X | X | X | X |
| b2.1 | X | X |  | X |  |  |  |  |  | X |  |  | X |
| b2.2 | X | X |  | X |  |  |  |  |  | X |  |  | X |
| b2.3 | X | X |  | X |  |  |  |  |  | X |  |  | X |
| b4.1 | X |  | X | X |  |  |  |  |  | X | X | X | X |
| b4.2 | X |  | X | X |  |  |  |  |  | X | X | X | X |
| c1.1 | X | X | X | X |  |  |  |  |  | X | X | X | X |
| c1.2 | X | X | X | X |  |  |  |  |  | X | X | X | X |
| c1.3 | X | X | X | X |  |  |  |  |  | X | X | X | X |

| 1. **Assessment Methods** | | | | | | | | | | |
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| **Competencies** | **Assessment Methods** | | | | | | | | | |
| **Written Exams** | **Oral Exam** | **Projects** | **Report** | **Quiz** | **Presentation** | **Practical Test** | **Observations** | **Dissertation** | **Online quiz** |
| a5.1 | X | X |  |  |  | X |  |  |  |  |
| a8.1 |  | X |  | X |  | X |  | X |  |  |
| a8.2 |  | X |  | X |  | X |  | X |  |  |
| b2.1 | X |  |  | X |  | X |  |  |  |  |
| b2.2 | X |  |  | X |  | X |  |  |  |  |
| b2.3 | X |  |  | X |  | X |  |  |  |  |
| b4.1 | X | X |  | X |  | X |  | X |  |  |
| b4.2 | X | X |  | X |  | X |  | X |  |  |
| c1.1 | X | X |  | X |  | X |  |  |  |  |
| c1.2 | X | X |  | X |  | X |  |  |  |  |
| c1.3 | X | X |  | X |  | X |  |  |  |  |

| 1. **Assessment Methods Weight** | |
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| **Assessment Method** | **Percentage** |
| **Final Exam** | 40 % |
| **Mid-term Exam** | 40 % |
| **Semester Work** | 20 % |
| **Total** | 100 % |

| 1. **List of References** | |
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| **Course Notes** | Lecture presentations used for data show and explanation to students during lecture sessions. |
| **Essential Books** | “Modern control engineering”, by Katsuhiko Ogata, Fifth Edition, 2017.  **Published by:** Prentice Hall  “Schaum’s outlines of electric circuits”, by Mahmood Nahvi & Joseph A. Edminister, seventh edition, 2018.  **Published by:** MsGraw-Hill |
| **Recommended Books** | “Automatic control systems”, by Farid Golnaraghi & Benjamin C. Kuo, Wiley, 16th Edition, 2018. |
| **Periodicals, Websites, etc.** | IEEE Journals and IEE Journals |

*We certify that all of the information required to deliver this course is contained in the above specification and will be implemented.*

Course Coordinator

Name: Dr. Mohammed Morad Salama

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| Signature: |  | Date: 5/9/2022 |

Head of Electrical Engineering and Computers Engineering Department

Name: Dr. Omar Makram Kamel

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| Signature: | E:\- institute\# اعمال الجودة بالمعهد\# The outputs\[29] توقيعات بخط اليد\dr. omar makram - signture\توقيع د. عمر مكرم - انجليزى - without background.jpg | Date: 5/9/2022 |