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**Department of Computer Science and Information Technology**

**College of Science**

**University of Salahaddin - Hawler**

**Subject: Robotics**

**Course Book – (3rd Year IT branch Students)**

**Lecturer's name: Dr. Dler Salih Hasan**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | Robotics |
| **2. Lecturer in charge** | Dr. Dler Salih Hasan |
| **3. Department/ College** | Computer Science and Information Technology / College of Science |
| **4. Contact** | e-mail:dler.hasan@su.edu.krdTel: (optional) |
| **5. Time (in hours) per week** | Theory: 1Practical: 2 |
| **6. Office hours** | Tuesday :8:30 am -10:30 pmSunday:10:30 am – 12:30 pm  |
| **8. Teacher's academic profile** |  |
| **9. Keywords** | **Robotics , Arduino , manipulators , sensors** |
| **10. Course overview:**In this course, students take on the roles of mechanical engineers, computer scientists and electrical engineers. Students research dynamics, kinematics and sensors. Subjects such as motion planning and obstacle avoidance, velocity and acceleration, serial chain mechanisms, and drive circuits are covered. Students put knowledge into practice through lab settings where robots are created with teams. This is likely to be the first course in a robotics program |
| **11. Course objective**.This course will introduce to participants in understanding of Arduino C open source microcontroller platform. Participants do not need to have experience in engineering or IT but keen to learn. Participants will learn: • The concept of microprocessor architecture and peripherals • Design and Program robots of different kinds and to achieve different tasks. |
| **12. Student's obligation**1- Attendance.1. Assignment
2. Homework
3. There examinations will be given, each 40%.
4. Final exam 60%.
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| **13. Forms of teaching**1- data show2- whiteboard |
| **14. Assessment scheme**1- Attendance 4%1. Assignment :10%
2. Homework :6%
3. There examinations will be given, each 30%.
4. Final exam 50%.

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| **15. Student learning outcome:** |
| **16. Course Reading List and References‌:**[Books on Google Play](https://play.google.com/store/books)

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* Robotics: Modelling Planning and Control, B. Siciliano,L. Sciavicco,L. Villani,G. Oriolo, Springer-Verlag, London, 2008Discovering Computers 2014, 1st Edition, Misty E. Vermaat, Purdue University Calumet, 2014 | Published College Bookstore Wholesale.
* Arduino Robotics, David John Warren, Harald Molle, and Josh Adams, 2011
* Programming Arduino "Getting Started with Sketches", Simon Monk,2012
* Arduino tutorial point, Tutorials Point (I) Pvt. Ltd., 2016
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| **17. The Topics:** | **Lecturer's name** |
| Dler Salih Hasan

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| **Week** | **Theory** | **LAB and ASSIGNMENTS** |
| 1 and 2 | Course Overview* Introduction to Robotics
* Industrial Robot
* Manipulator Structures

. | a) Introduction to Robotics systems and its main components b) Comparison of and Arduino c) Getting started with Arduino |
| 3 and 4 | * History of Robotics
* General Framework of Robotics
* Classification of Robot
 | How to Program Arduino using Scratch using VBBA simulator |
| 5 and 6 | Introduction to Arduino: Setting up the programming environment and basic introduction to the Arduino micro-controller | e) Scratch programming of a LED ON/OFF f) Scratch programming using PUSH BUTTON |
| 7 and 8 | Introduction to Circuits: Utilizes Ohm's Law. Introduction to multiple resistor circuits, diodes, switches, LEDs, conditional statements, block diagrams, and named circuits. | Basic C commands :Program structure |
| 9 -10 | Introduction to Digital Pins: Utilizes Ohm's Law, Block Diagrams, LED circuits. Introduce loops, PWMs, shift registers, and more complex coding with functions | Experiment 1: LED Blink (Digital Out)d) Experiment 2: Push Button (Digital In) |
| 11 to 14 | Introduction to Analog Pins: Utilizes Circuit Analysis, Block Diagrams, LED circuits. Introduce analog inputs, use of a PWM, photocell, flex sensor, temperature sensor,  | e) Experiment 3: Photo-resistor( Analog Read) f) Experiment 4: IR Sensor Read (Analog Read)/ |
|  | FINAL EXAM | FINAL LAB TEST |

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| **20. Qustions**1. **What is the difference between kinematics and dynamics?**
2. **Using Arduino microcontroller design a electronic circuit and write the sketch to connect 3 LEDs.**
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