**Road Map of BS(R&IS) Updated**

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| **Fall 2024 Roadmap BS Robotics and Intelligent Systems**  |
|  |
| **FIRST YEAR** |
| **Fall Semester (1st)** | **Spring Semester (2nd)** |
| **Code** | **Course Title** | **CH** | **Pre-req** | **Code** | **Course Title** | **CH** | **Pre-req** |
| EE125 | Applications of ICT | 2 | - - - - | MA230 | Differential Equations | 3 | MA111 |
| EE125L | Applications of ICT Lab | 1 | - - - - | RI120 | Robot Kinematics | 3 | - - - - |
| MA107 | Calculus and Analytical Geometry | 3 | - - - - | RI110 | Introduction to Robotics | 3 | - - - - |
| EN104 | Functional English | 3 | - - - - | RI110L | Introduction to Robotics Lab | 1 | - - - - |
| EE110 | Circuit Analysis | 3 | - - - - | CS143 | Programming Fundamentals | 3 | - - - - |
| EE110L | Circuit Analysis Lab | 1 | - - - - | CS143L | Programming Fundamentals Lab | 1 | - - - - |
| ME124 | Engineering Mechanics | 3 | - - - - | HM150 | Islamic Studies/Ethics | 2 | - - - - |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Total** | 16 |  | **Total** | 16 |
| **SECOND YEAR** |
| **Fall Semester (3rd)** |  |  | **Spring Semester (4th)** |
| **Code** | **Course Title** | **CH** | **Pre-req** | **Code** | **Course Title** | **CH** | **Pre-req** |
| EE220 | Digital Logic Design | 3 | - - - - | EE360 | Control Systems | 3 | EE315 |
| EE220L | Digital Logic Design Lab | 1 | - - - - | EE328L | Control Systems Lab | 1 |  |
| MA210 | Linear Algebra | 3 | - - - - | EE306 | Probability and Statistics for Engineers | 3 | - - - - |
| EE315 | Signals and Systems | 3 | - - - - | EE213 | Data Structures and Algorithms | 3 | CS143 |
| EE315L | Signals and Systems Lab | 1 | - - - - | EE213L | Data Structures and Algorithms Lab | 1 |  |
| SS171 | Ideology and Constitution of Pakistan | 2 |  | RI225 | Introduction to Artificial Intelligence | 2 | - - - - |
| SD210 | Civics and Community Engagement | 2 |  | RI225L | Introduction to Artificial Intelligence Lab | 1 |  |
| SDXXX | Occupational Health and Safety | 1 |  | RI230 | Mechanical Design for Robots | 3 |  |
| HMXXX | Arts & Humanities Elective | 2 |  | RI230L | Mechanical Design for Robots Lab | 1 |  |
| **Total** | 18 |  | **Total** | 18 |
| **Summer Semester** |  |  |  |  |
| SD100 | English Immersion | 0 |  |  |  |  |  |
| **THIRD YEAR** |
| **Fall Semester (5th)** |  |  | **Spring Semester (6th)** |
| **Code** | **Course Title** | **CH** | **Pre-req** | **Code** | **Course Title** | **CH** | **Pre-req** |
| EN126 | Expository Writing | 3 | - - - - | RI340 | Intelligent Control Systems | 3 |  |
| RI312 | Sensors and Actuators | 3 | - - - - | RI340L | Intelligent Control Systems Lab | 1 |  |
| EE329 | Embedded Systems | 3 | - - - - | RI3XX | Elective-I | 3 | - - - - |
| EE329L | Embedded Systems Lab | 1 | - - - - | RI3XXL | Elective-I Lab | 1 | - - - - |
| RI325 | Robot Operating System | 3 | - - - - | RI356 | Computer Vision | 3 | - - - - |
| RI325L | Robot Operating System Lab | 1 | - - - - | RI356L | Computer Vision Lab | 1 | - - - - |
| RI330 | Robot Motion Planning and Control | 3 |  | RI3XX | Elective-II | 3 |  |
| RI330 L | Robot Motion Planning and Control Lab | 1 |  | NSXXX | Natural Science Elective | 3 |  |
|  |  |  |  |  |  |  |  |
| **Total** | 18 |  | **Total** | 18 |
| **Summer Semester** |  |  |  |  |
| SD102 | 21st Century Skills | 0 |  |  |  |  |  |
| **FOURTH YEAR** |
| **Fall Semester (7th)** |  |  | **Spring Semester (8th)** |
| **Code** | **Course Title** | **CH** | **Pre-req** | **Code** | **Course Title** | **CH** | **Pre-req** |
| RI491 | Final Year Design Project I | 2 | - - - - | RI492 | Final Year Design Project II | 4 | - - - - |
| SSXXX | Social Science Elective | 2 | - - - - | RI4XX | Elective-V | 3 | - - - - |
| RI425 | Numerical Computing | 3 | - - - - | RI4XXL | Elective-V Lab | 1 | - - - - |
| RI430 | Robot Design | 3 | - - - - | SS306 | Entrepreneurship | 3 | - |
| RI430L | Robot Design Lab | 1 | - - - - |  | COOP | 6 |  |
| RI4XX | Elective-III | 3 |  |  |  |  |  |
| RI4XX | Elective-IV | 3 | - - - - |  |  |  |  |
| **Total** | 17 |  | **Total** | 11 |
| **Total Credit Hours: 132 (Without COOP), Total Credit Hours: 138 (With COOP)**  |

**Approved Elective Courses in BS(R&IS)**

**Recommended List of Arts and Humanities Electives (2+0)**

1. Communication and Presentation skills (EN130)
2. Professional Ethics (BP238)
3. Foreign Languages (SD222)

**Recommended List of Social Science Electives (2+0)**

1. Critical Thinking. (SS201)
2. Engineering Economics. (MS224)
3. Engineering Management.(MS323)

**Recommended List of Natural Science Electives (3+0)**

1. Numerical Analysis (MA422)
2. Discrete Mathematics (MA105)

**Recommended List of Electives**

1. Autonomous Mobile Robots [3+1] (RI345), (RI345L)
2. Mobile robots and navigation [3] (RI350)
3. Digital Image Processing [3] (EE452)
4. Internet of Things [3+1] (EE453), (EE453L)
5. Wireless Communication [3] (EE480)
6. Applied Machine Learning [3+1], (EE440), (EE440L)
7. Networks and Communication [3+1] (RI448), (RI448L)
8. Industrial Robotics [3] (RI435)
9. Medical Robots [3] (RI437)
10. Aerial Robotics [3+1] (RI436) (RI436L)
11. Agricultural Robotics [3] (RI440)
12. Manufacturing Processes [3] (RI442)
13. Cloud Computing [3+1] (RI443), (RI443L)
14. Augmented Reality and Virtual Reality [3] (RI450)
15. Natural Language Processing [3] (RI455)
16. Human-Robot Interaction [3] (RI456)
17. Intelligence System [3] (RI456)