**Description of Course: IRE 308**

**PART A: General Information**

| **1** | **Course Title** | : System Design, Engineering and Testing Sessional |
| --- | --- | --- |
| **2** | **Type of Course** | : Compulsory, Sessional |
| **3** | **Offered to** | : Department of IoT and Robotics Engineering (IRE) |
| **4** | **Pre-requisite Course(s)** | : None |

**PART B: Course Details**

1. **Course Content (As approved by the Academic Council)**

Fundamentals of systems engineering; introduction to systems engineering management, system engineering process overview/project life cycle; concept studies, concepts and technology development, preliminary design and technology completion; final design and fabrication, system assembly, integration and test launch, operations and sustainability, closeout funding, budget cycle, tailoring and customization, requirements analysis, functional analysis and allocation, system design engineering, design synthesis, verification.

Technical reviews and audits, trade studies, modeling and simulation, product realization, metrics, risk management, systems engineering planning, product improvement strategies, cross cutting technology management, organizing and integrating system development, contractual considerations, management considerations and summary.

1. **Course Objectives**

The objective of this course is to provide students with hands-on learning on the engineering practices for system design, development and testing.

1. **Knowledge required:** Concepts of IoT and Robotics Technologies
2. **Course Outcomes (COs)**

| CO No. | CO Statement | Corresponding PO(s)\* | Domains and Taxonomy Level(s)\*\* | Delivery Method(s) and Activity(-ies) | Assessment Tool(s) |
| --- | --- | --- | --- | --- | --- |
| 1 | Describe and Apply different analysis and design based methodologies for real world and state-of-the-art systems development. | PO1, PO2 | C4 | Lectures, Lab demonstrations | Lab-tasks, Lab-tests, Reports |
| 2 | Able to write clear and concise system requirements and convert them into technical specifications. | PO8, PO11 | C4 | Lectures, Lab demonstrations | Lab-tasks, Lab-tests, Reports |

**Cognitive Domain Taxonomy Levels: C1-** Knowledge**, C2-** Comprehension, **C3-**Application, **C4-** Analysis, **C5-** Synthesis, **C6-** Evaluation; **Affective Domain Taxonomy Levels**: **A1**- Receiving, **A2**- Responding, **A3**- Valuing, **A4**- Organizing, **A5**- Characterizing; **Psychomotor Domain Taxonomy Levels**: **P1**-Perception, **P2**- Set, **P3**- Guided Response, **P4**- Mechanism, **P5**- Complex Overt Response, **P6**- Adaptation, **P7**- Organization

**Program Outcomes (PO):** **PO(a)** Engineering Knowledge**, PO(b**) Problem Analysis**, PO(c)** Design/development Solution, **PO(d)** Investigation, **PO(e)** Modern tool usage, **PO(f)** The Engineer and Society, **PO(g)** Environment and sustainability, **PO(h)** Ethics, **PO(i)** Individual work and team work, **PO(j).** Communication, **PO(k)** Project management and finance, **PO(l)** Life-long Learning

\* For details of program outcome (PO) statements, please see the departmental website or course curriculum

1. **Mapping of Knowledge Profile, Complex Engineering Problem Solving and Complex Engineering Activities**

| **CO** | **K1** | **K2** | **K3** | **K4** | **K5** | **K6** | **K7** | **K8** | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** | **A1** | **A2** | **A3** | **A4** | **A5** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **✔️** |  |  |  |  |  |  |  | **✔️** |  |  |  |  |  |  | **✔️** |  |  |  |  |
| **2** |  |  | **✔️** |  |  |  |  |  |  | **✔️** |  |  |  |  |  |  |  |  | **✔️** |  |

1. **Lecture/ Activity Plan**

| **Week** | **Topics** |
| --- | --- |
| Week 1 | Group Formation, Project Selection and SDLC |
| Week 2 | Project Schedule, Gantt Chart |
| Week 3 | Preparation of System Requirement Specification (SRS), Design Documents |
| Week 4 | Preparation of System Configuration Management and Risk Management Related Documents |
| Week 5 | USE CASE Diagram, Data Flow Diagram & System Architecture Design |
| Week 6 | **Lab Midterm Examination** |
| Week 7 | **Project Progress Evaluation** |
| Week 8 | Basic Implementation & Coding Begins – Set up repositories, initial development |
| Week 9 | Advanced Implementation & Feature Development |
| Week 10 | System Integration & Preliminary Testing (Basic Unit Tests) |
| Week 11 | Develop Test Cases for Unit Testing and Integration Testing |
| Week 12 | Develop Test Cases for White Box and Black Box Testing Techniques |
| Week 13 | **Lab Final Examination** |
| Week 14 | **Final Project Showcase & Evaluation** |

1. **Assessment Strategy**

* Class participation will be judged by in-class evaluation; attendance will be recorded in every class.
* Continuous assessment will be done in the form of laboratory tasks, assignments, laboratory-tests, report writing and viva.
* Project assessment marks will be awarded according to the successful completion of project milestones as detailed in the project guide.

1. **Distribution of Marks**

| **Criterion** | **Marks** |
| --- | --- |
| Attendance | 10% |
| Lab Performance | 10% |
| Lab Reports | 10% |
| Project Proposal | 10% |
| **Mid Term** | |
| Mid Term Examination at **6th** Week | 12% |
| Progress Presentation at **7th** Week | 12% |
| **Final Exam** | |
| Final Project Showcase at **13th** Week | 18% |
| Lab Final Examination at **14th** Week | 18% |
| **Total** | **100%** |

1. **Textbook/Reference**

* Systems Engineering Fundamentals, 2001, DoD
* NASA System Engineering Handbook

Besides going through relevant topics of the textbook, it is strongly advised that the students follow the class lectures and discussions regularly for a thorough understanding of the topics.

**Course Teacher(s):**

| **Name:** | **Office/Room:** | **E-mail and Telephone:** |
| --- | --- | --- |
| Md Rafiqul Islam | Ground Floor, Academic Building | rafiqul0001@bdu.ac.bd, and 01521108404 |

| **Prepared by:** |
| --- |
| Name: Md Rafiqul Islam  Signature: |
| Date of Preparation: |
| Date of Approval by BUGS: |