

## **SECOND MAJOR IN SYSTEMS ENGINEERING**

### **Course Requirements for Students admitted in AY2021/2022 and after**

To be awarded a degree with Second Major in Systems Engineering, students must pass **at least 40 Units** of the following courses, which include:

#### **CORE COURSES** (24 Units)

Pass 5 core courses, which include:

IE2111 Industrial & Systems Engrg Principles & Practice II  
IE2110 Operations Research I  
IE2141 Systems Thinking and Dynamics  
IE3105 Fundamentals in Systems Engineering & Architecture  
IE3102 System Engineering Project (8 Units) <sup>see Note 1</sup>

#### **ELECTIVES COURSES** (8 Units)

Pass at least 8 Units from the following:

CS2113T Software Engineering & Object-Oriented Programming  
IE3101 Statistics for Engineering Applications  
IE3110R Simulation  
IE3250 Human Factors Engineering  
IE4240 Project Management (or equivalent)  
IE4243 Decision Modeling & Risk Analysis  
IE5231 Statistical Methods for Process Design & Control

#### **SYSTEMS COURSES** (8 Units)

Pass at least 8 Units from the following:

##### **Industrial Systems**

IE3120 Manufacturing Logistics  
IE4220 Supply Chain Modeling  
IE4221 Transport Demand Modeling & Economics

##### **Infrastructure Systems**

CE3101 Integrated Infrastructure Project  
CE3102 Socio-Economically Sustainable Developments  
CE3121 Transportation Engineering  
CE3132 Water Resources Engineering  
CE4221 Design of Land Transport Infrastructures  
CE4282 Building Information Modeling for Project Management  
ESE3101 Solid and Hazardous Waste Management

### **Computer Systems**

CS2102 Database Systems  
CS4244 Knowledge Representation and Reasoning  
CS4246 AI Planning and Decision Making

### **Electrical/ Electronic Systems**

EE3331C Feedback Control Systems  
EE3506C/EE2029 Introduction to Electrical Energy Systems (4 Units/3 Units)  
EE4305 Fuzzy/Neural Systems for Intelligent Robotics  
EE4307 Control Systems Design & Simulation  
EE4308 Autonomous Robot Systems  
EE4501 Power System Management & Protection  
EE4511 Renewable Generation and Smart Grid

### **Mechanical Systems**

ME4226 Energy & Thermal Systems  
ME4246 Modern Control Systems  
ME4263 Fundamentals of Product Development

### **Chemical Systems**

CN4122 Process Synthesis & Simulation (3 Units)  
CN4201R Petroleum Refining  
CN4238R Chemical & Biochemical Process Modelling

### **Biomedical Systems**

BN3101 Biomedical Engineering Design (6 Units)  
BN4203 Robotics in Rehabilitation

#### Note 1

IE3102 is a year-long course. The project work spans over a period of two semesters. Eligible students should contact ISEM Department at [ug\\_isem@nus.edu.sg](mailto:ug_isem@nus.edu.sg) to indicate their intention to take the course before term starts.

- For project starting in Semester 1, please contact the Department by May.
- For project starting in Semester 2, please contact the Department by October.

#### Note 2

Students who complete the 5 core courses will be awarded a [Minor in Systems Engineering](#) if they do not wish to complete all the requirements for the Second Major in Systems Engineering.

### **Course requirements for Minor in Systems Engineering**

Pass the following 5 courses:

IE2110 Operations Research I  
IE2111 Industrial & Systems Engineering Principles & Practice II  
IE2141 Systems Thinking and Dynamics  
IE3105 Fundamentals in Systems Engineering & Architecture  
IE3102A Systems Engineering Project