



enginite

**ENGINEERING and INDUSTRY  
INNOVATIVE TRAINING FOR ENGINEERS  
(ENGINITE)**

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## **IO3-T1: Specification of the courses**

Prepared by CUBEIE LCC



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# 1. Introduction

The aim of this document is to present a comprehensive description of the eight courses which will be designed and developed through the ENGINITE project and based on the Problem Based Learning (PBL) methodology.

The courses are divided into two categories (a) Employability Enhancement & Managerial Skills and (b) Technical Knowledge Enhancement. Each category includes four courses which aim to cover a wide range of hands-on knowledge and skills required by the industry.

All eight courses have been enacted based on a previous market research and literature review which was conducted by CUBEIE LLC. The market research was performed using mirrored questionnaires with the scope to explore the needs of both companies and graduates Engineers in terms of needs, knowledge and skills. More than 50 companies and more than 200 engineers have participated in this research.

The table below presents all eight courses and the partner of the consortium who is responsible for the design, development and improvement of each course.. The allocation of the courses has been done based on the partner experiences and background and was agreed during the kick-off meeting of the ENGINITE project.

**Table 1:** Courses titles and responsible partner

<b>A</b>	<b>Employability enhancement &amp; managerial skills</b>	<b>Responsible Partner</b>
<b>A1</b>	Applied Efficient Quality and Health & Safety Management Systems	TUC
<b>A2</b>	Innovation, Entrepreneurial and Intrapreneurial skills	GrandXpert
<b>A3</b>	Engineering Systems Thinking: Re-engineering by Simplifying	CUT
<b>A4</b>	Project Management in Action	Cubeie LLC

<b>B</b>	<b>Technical knowledge enhancement</b>	<b>Responsible Partner</b>
<b>B1</b>	Engineering economics	LSBU
<b>B2</b>	Product development. From concept to market	CUT
<b>B3</b>	Applied Process and Production Optimization	LSBU
<b>B4</b>	Engineering Logistics and Supply Chain Analysis in practice	TUC

## 2. Courses Description

### A. Employability Enhancement & Managerial Skills

The first part of the training, named: *“Employability Enhancement & Managerial Skills”* focuses on capitalizing holistic technical engineering knowledge, as well as managerial and soft skills. These are essential requirements for professional excellence and efficient collaboration in corporate and multi-disciplinary environments. Four courses are included in this part and brief description is provided below:

#### A.1. Applied Efficient Quality and Health & Safety Management Systems

This course introduces the participants to the world of standardization and management to the all-important engineering activities in everyday practice. Efficient development and implementation of management systems requires understanding of their necessity, based on sound knowledge of legislation and customers’ demands. Engineers will be presented with, and asked to find solutions to problems arising from inefficient management systems. They shall develop their own toolbox for overcoming such problems in their future career. As a second main theme, the course shall elaborate on the importance of nurturing an integrated health and safety culture. Based on practical examples, engineers will become acquainted with hands-on techniques for establishing, maintaining and developing a corporate culture for all involved parties: the organization, the employees, the customers, the suppliers, the associates and the society. Different topics and models are analyzed by employing case studies and real problems from the industry.

#### Key learning outcomes:

Upon completion of the course, participants should be able to:

- Identify and apply the principles of the Quality and Health and Safety Management Systems (Q&HSE MS).
- Develop in-depth knowledge on various tools and techniques of the Management Systems.
- Evaluate the principles of quality management and explain how these principles can be applied in the industrial sector.
- Develop a road map for implementing and maintaining the Q&HSE MS in an organization.

#### A.2. Innovation, Entrepreneurial and Intrapreneurial skills

In this course the participating engineers will be introduced to the driving forces of our era: innovation coupled with creative business development. Participants shall be requested to foster their interpersonal skills with a creative utilization of their background. Communication, presentation and negotiation skills development is a core element and success facilitator within this course. A challenging and fascinating environment will be established by using motivating problems, team exercises, and guest speakers to turn the course into a lifetime experience. The learning outcomes will boost engineers in their future career. Engineers may employ the gained knowledge within a startup or a multinational company; in a cutting-edge project or in some traditional sector challenged by present market conditions; during routine or crisis situations. Whatever the scenario, the engineers will be well equipped and ready to handle the situation with creativity and professionalism.

#### Key learning outcomes:

Upon completion of the course, participants should be able to:

- Demonstrate the fundamental principles and methods of innovation, entrepreneurship and intrapreneurship.
- Develop and apply business models.
- Utilize tools to explore and create innovative business ideas.
- Develop and introduce of innovation and entrepreneurship/intrapreneurship culture in an organization.
- Communicate, finance, or market a new idea, product, or initiative.

#### **A.3. Engineering Systems Thinking: Re-engineering by Simplifying**

Systems thinking is a holistic approach to analysis that focuses on the way that a system's constituent parts interrelate and how systems work over time and within the context of larger systems. The engineers will be trained how to employ their engineering knowledge to identify the problem by viewing the big picture and provide alternative solutions. Analytical thinking and the ability to break down complex processes, problems and situations into single units and find the interrelations among them is an essential competence for each engineer and that is the main focus of the course. This is what industry needs for today in order to overcome everyday problems, evolve and conquer its market. The course provides a tool-box of applied system thinking, to help the engineers improve analytical thinking, problem solving and decision-making skills. Through an appreciation of multiple viewpoints, perspectives and systems, thinking analysis is taken to a new level.

#### Key learning outcomes:

Upon completion of the course, participants should be able to:

- Recognize the fundamentals of systems thinking.

- Utilize system thinking tools.
- Holistically approach any working situation.
- Come up with robust solutions to complex problems through critical thinking and problem-solving skills.
- Assess, organize long term strategies for systemic changes.

#### A.4. Project Management in Action

The course aims to enrich engineers' knowledge and capabilities in Project Management and enable them to successfully participate in or lead complex projects with tight schedule, limited resources, yet with high quality results. Besides in real-world industrial workplaces, parameters constantly change and problems have to be overcome, thus the engineers need to be properly trained. For this purpose, real industrial projects in combination with the Problem Based Learning (PBL) approach will be used during the course, to equip the engineers with the required skills. Great organizational and analytic skills, understanding of leadership, management and teamwork, along with a holistic grasp of the project-at-hand are just some of the capabilities that engineers need and will acquire through this course. Good practices and user-friendly software will also be available as participants' tools.

#### Key learning outcomes:

Upon completion of the course, participants should be able to:

- Apply Project Management design and development in real projects
- Recognize the important elements of efficient team working and leadership in project management
- Manage effectively any project in terms of cost, timeframes, quality, and deliverables.
- Perform risk assessment for the main parameters of the project.
- Learn how to monitor project activities and assess progress
- Define and monitor Key Performance Indicators (KPIs) as well as take corrective measures for the project success
- Employ scheduling software productively along with applied technics.

## **B. Technical Knowledge Enhancement**

The second part of the training, named: “**B. Technical knowledge Enhancement**” focuses on providing professional technical knowledge and its utilization in the competitive and demanding environment of the industry sector. Four courses are included in this part and brief description is provided below:

### **B.1. Engineering Economics**

This course emphasizes the economic principles and the analysis of engineering decisions. Thus, the strong relationship between engineering design and manufacturing of products/systems and the evolved economic aspects, along with applied concepts of the time value of money and equivalence, will be highlighted in the course. It is essential for both industry and engineers to be able to transform a concept and/or project into requirements, equipment and a reliable estimation for resources and critical parameters such as cash flows, capital, operational and maintenance costs and cost of money. The correct assumptions, the capability of investigation and location of the right partner and provider, along with the magic of creating a realistic economic-technical model are the core elements of this course. Real problems and cases from the industry will be introduced and the Engineers will be called to propose their engineering economic analysis report.

#### Key learning outcomes:

Upon completion of the course, participants should be able to:

- Define, estimate and analyse engineering - industrial project costs.
- Compline creatively knowledge of mathematics, economics, and engineering principles to solve engineering industrial problems.
- Efficiently perform money management and use gained knowledge to make economic assessments of alternative engineering designs, solutions or projects.
- Understand, formulate and employ cash flow models in practical situations, by taking into account rational assumptions, interest factors and data from the industry underlying these models

### **B.2. Product development. From concept to market**

During this course, engineers will learn how to create, develop and lunch new products in established industrial firms. Innovative or improved products are required for ensuring competitive advantage and growth of every company and this is what the course is focused on. A combination of marketing, design, manufacturing knowledge and skills will be gained through workshops and real case studies.

Key learning outcomes:

Upon completion of the course, participants should be able to:

- Understand the importance of new products development in industry market.
- Propose new products to satisfy the needs of customers and the industry.
- To successfully implement the steps required from concept generation to design and develop of new proposed product.
- Evaluate and assess the risk and the cost of the new product production.

**B.3. Applied Process and Production Optimization**

This course will enhance the engineering capabilities and provide hands-on skills to optimize an industrial process or manufacturing line. Engineers will learn to select the correct assumptions and parameters for their problems in order to capture a realistic process analysis and achieve optimization of resources and cost.

Key learning outcomes:

Upon completion of the course, participants should be able to:

- Detect and outline the key issues of the design and optimization of a production line.
- Utilize a critical-thinking and problem-solving approach in regards to the main principles of production engineering.
- Explore, assess and adopt best practices of production industry to existing or new production facilities.
- Report engineering calculations in a professional manner

**B.4. Engineering Logistics and Supply Chain Analysis in practice**

This course aims to provide practical knowledge and technical skills for understanding, analyzing and managing logistics and supply chain of the industrial sector. Engineers will learn practically how products and services end-up to the final customer including transportation and logistics processes, all involved parties and the relevant legislation requirements. Moreover, Engineers will be able to contribute effectively of the supply change optimization, narrowing down the logistics cost and even to set up new processes.

Key learning outcomes:

Upon completion of the course, participants should be able to:

- Understand the concept and the structure of supply chains
- Employ fundamental models to make trade-offs between forecasting, inventory, and transportation.
- Identify ways through which supply chains can become competitive in the market
- Introduce the concepts of integrated logistics support for the industry
- Conduct engineering logistics analysis

### 3. Consortium

This document has been produced by the consortium of the ENGINITE project



**P1-CYPRUS UNIVERSITY OF TECHNOLOGY [CUT]**



**P2-AALBORG UNIVERSITET [AAU]**



**P3-CUBEIE L.L.C. [CUBEIE]**



**P5-TECHNICAL UNIVERSITY OF CRETE [TUC]**



**P6-GRANTXPRT CONSULTING LTD [GrantXpert]**



**P7-USEFUL SIMPLE PROJECTS LTD [ThinkUP]**