

IDENTIFICATION

Course code : ESI-SPI-CI-AG4-S7-UE1-EC3
ECTS : 3

DURATION

Lectures : 16
Tutorial classes : 14
Labs : 8
Total : 38

Project :
Personnal work :

ASSESSMENT

TEACHING MATERIALS

LANGUAGE

English

CONTACT

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UE : UE7-PROD

COURSE : Sizing

SCOPE OF THE COURSE

OBJECTIVES

This course aims to prepare students for the technical, economic and organizational challenges related to the design, sizing and modernization of agri-food production units. It seeks to master food processing methods, design and size a plant in its entirety (process, building and utilities), optimize material, energy and logistics flows, integrate health, environmental and regulatory constraints, and support industrial decision-making, particularly regarding investment and technological choices.

COMPETENCE AND SKILLS

The design of an agri-food unit, as a strategic project integrating process, building and industrial organization, aims to develop skills in process control and standards, as well as project management, particularly in planning, budget management and activity coordination. Students also acquire skills in sizing (material and energy balances, equipment, utilities), industrial design (specifications, PFD/P&ID diagrams, layout, site selection) as well as techno-economic analysis and performance optimization, integrating technological innovations.

PROGRAM

Introduction to the sizing of agri-food units, as well as location and selection of industrial sites, taking into account essential criteria, and the design methodology through the basic file (objectives, constraints and strategic orientations) with a specifications methodology, the simplified preliminary project (APS) and the detailed preliminary project (APD), team building.

Development of technical basic files : descriptive sheets for inputs and outputs, the process, equipment, functional connections, hygiene or sanitation plan.

Selection of an industrial site : economic, techno-economic and regulatory parameters.

Flows : review of production flow management, technologies, constraints and storage, sizing and layout rules for premises, building layout approach.

Fluids and energy.

— Additional technical files — Technical information management ; Maintenance ; Applied hygiene regulations.

Consideration of storage and logistics, waste and wastewater management, environmental aspects, energy and its optimization, as well as safety, personnel and site monitoring. Presentation of design phases : conceptual phase (PFD, layout, UFD), preliminary phase (P&ID, sizing) and final phase (execution plans), integrating economic and regulatory parameters. Selection of equipment (transport, separation, mixing, thermal processes, drying, concentration/evaporation, packaging, etc.) and industrialization of food products, including the enhancement of traditional Réunionese products, their transformation into industrial processes, technological innovation and the development of exportable products. Design and develop sustainable agri-food activities. Eco-design food products by integrating sustainability and environmental respect principles.

BIBLIOGRAPHY

Alimentec Industries (1994). *Réussir votre usine agro-alimentaire : De la décision d'investir à la rédaction du cahier des charges*, technique et documentation. Charvolin, M., Duchet, M., & FEIGEL, G. (2006). *Conception des lieux et des situations de travail*. INRS Lopez-Fellows, Peter ; Axtell, Barrie (2005). *Créer et gérer une petite entreprise agroalimentaire*, GRET, 277 p. Gomez A. (2005). *Food Plant Design*, Taylor and Francis. Maroulis Z. and Saravacos G. (2007). *Food Plant Economics*, CRC Press Pignault J. and Sohier L. (1997). *Conception des unités de production ou de transformation*, techniques de l'ingénieur. RIA. Paris (1992). *L'usine agro-alimentaire : guide de conception et de réalisation*, CRITT IAA Idf

REQUIREMENTS

Food process engineering, Complementary physics, Automation/Maintenance, Production and logistics management, Quality approach, Project management, Basic knowledge in market studies, Competitor analysis.