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**COURSE (TITLE):** Biotechnological Industrial Processes

**LECTURER:**

**YEAR and SEMESTER:** 2019, First

**CREDITS (CFU):** 3

**SECTOR (SDS):** ING-IND/25 Chemical Plants

**ACADEMIC YEAR:**

**ASSESSMENT:** written exam

**LOCATION:** Department of Environmental, Biological and Pharmaceutical Science and Technologies, Via Vivaldi 43 Caserta

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**COURSE OBJECTIVES/OUTCOMES:**

The course aims to provide the basic concepts necessary to formulate and solve material and energy balances of biotechnological industrial processes. Fundamentally, is introduced the engineering approach to solving process-related problems: breaking a process down into its components, establishing the relations between known and unknown process variables, assembling the information needed to solve unknown process variables in order to obtain the desired problem solution.

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**SYLLABUS (overview):**

Introduction to engineering calculations; processes and process variables; process classification; material balances on non-reactive processes; material balances on reactive processes; energy balances on non-reactive processes; energy balances on reactive processes.

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**SYLLABUS (Detailed description):**

**Introduction to Engineering Calculations:** Units and Dimensions; Conversion of Units; Dimensional Homogeneity; Systems of Units.

**Processes and Process Variables:** Mass and Volume; Flow Rate; Chemical Composition; Pressure and Temperature.

**Fundamentals of Material Balances:** Process Classification; Material Balance Calculations; Balances on Multiple-Unit Processes; Chemical Reaction Stoichiometry; Balances on Reactive Processes.

**Fundamentals of Energy Balances:** The First Law of Thermodynamics; Kinetic and Potential Energy; Energy Balances on Closed Systems; Energy Balances on Open Systems at Steady State; Tables of Thermodynamic Data; Elements of Energy Balance Calculations; Changes in Pressure at Constant Temperature; Changes in Temperature; Phase Change Operations; Heats of Reaction; Measurement and Calculation of Heats of Reaction; Formation Reactions and Heats of Formation; Energy Balances on Reactive Processes; Simultaneous Transient Balances.

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**TEXTBOOKS:**

R.M. Felder e R.W. Rousseau (2000). Elementary Principles of Chemical Processes, J. Wiley

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**ADDITIONAL READING:**

Course notes, article reprints.

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