

PROGRAMME OF "IMPIANTI BIOCHIMICI INDUSTRIALI ED AMBIENTALI" "DESIGN AND PROCESS ANALYSIS OF ENVIRONMENTAL AND BIOCHEMICAL PROCESSES"		
<ul style="list-style-type: none"> • CODE: I0301 • TYPE OF COURSE UNIT: COMPULSORY BUT SELECTED AMONG THREE POSSIBLE TEACHING ACTIVITIES • LEVEL OF COURSE UNIT: SECOND CYCLE • YEAR OF STUDY (IF APPLICABLE); SEMESTER: SECOND YEAR, FIRST SEMESTER 		
NUMBER OF ECTS CREDITS: 9 (WORKLOAD IS 225 HOURS OF TEACHING; 1 CREDIT = 25 HOURS)		
Teacher: Prof. Francesco Veglio' (Francesco.veglio@univaq.it)		
1	Course objectives	<p>THE MAIN OBJECTIVE OF THE COURSE IS TO GIVE THE MAIN INFORMATION AND TOOLS ON THE DESIGN OF BIOCHEMICAL AND ENVIRONMENTAL PROCESSES WITH PARTICULAR ATTENTION TO BIOTECHNOLOGICAL APPLICATIONS, MUNICIPAL AND INDUSTRIAL WASTEWATER TREATMENTS AND WASTE RECYCLING. GENERAL CRITERIA OF DESIGN OF BIOREACTORS, MIXING, UP-STREAM AND DOWNSTREAM TECHNOLOGIES ARE DESCRIBED GIVING SOME PRACTICAL AND EXISTING ENGINEERING EXAMPLES. THE GENERAL APPROACH TO CARRY OUT PROCESS ANALYSIS AND ITS TECHNICAL-ECONOMICAL FEASIBILITY ARE CONSIDERED ON THESE EXAMPLES. IN THIS MANNER THE STUDENTS SHOULD BE ABLE TO DESIGN BIOCHEMICAL AND ENVIRONMENTAL PROCESSES UNTIL TO THE ESTIMATION OF THE TECHNICAL AND ECONOMIC FEASIBILITY STUDIES. THIS MODULE IS LINKED TO OTHER TEACHING MODULES OF THE SECOND YEAR BECAUSE IT GIVES SOME PRACTICAL INSTRUMENTS TO DESIGN CHEMICAL AND BIOCHEMICAL PROCESSES AND AT THE SAME TIME IT GIVES SOME USEFUL AND PRACTICAL SKILLS OFTEN REQUIRED IN INDUSTRIAL PRACTICAL EXPERIENCE.</p>
2	Course content and Learning outcomes (Dublin descriptors)	<p>TOPICS OF THE MODULE INCLUDE:</p> <p>BIOCHEMICAL PROCESS AS A STOICHIOMETRY. KINETIC MODELS OF MICROBIAL GROWTH. BIOREACTORS CONFIGURATION: BATCH, CONTINUOUS AND SEMI-CONTINUOUS BIOREACTORS. BIOREACTORS WITH PARTIAL RECIRCULATION OF BIOMASS, BIOREACTORS IN SERIES, MEMBRANE BIOREACTORS. STABILITY OF BIOREACTORS. OXYGEN MASS TRANSFER AND MIXING. UP-STREAM AND DOWNSTREAM PROCESSES: CELL RUPTURE, FILTRATION, CENTRIFUGATION, SEDIMENTATION, MEMBRANE PROCESSES (MICRO AND ULTRA FILTRATION, NANO FILTRATION AND REVERSE OSMOSIS), STERILIZATION, LIQUID-LIQUID EXTRACTION WITH AND WITHOUT CHEMICAL REACTION. PROCESS ANALYSIS AND USE OF COMMERCIAL SOFTWARE FOR TECHNICAL AND ECONOMIC FEASIBILITY STUDIES.</p> <p>ON SUCCESSFUL COMPLETION OF THIS MODULE, THE STUDENT SHOULD</p> <ul style="list-style-type: none"> - HAVE PROFOUND KNOWLEDGE OF BIO REACTORS AND DOWNSTREAM DESIGN PROCEDURES, - HAVE KNOWLEDGE AND UNDERSTANDING OF THEORETICAL AND PRACTICAL PRINCIPLES OF PROCESS ANALYSIS, - UNDERSTAND AND EXPLAIN THE MEANING OF COMPLEX AND INTEGRATED PROCESSES IN THE AMBIT OF BIOCHEMICAL AND ENVIRONMENTAL INDUSTRIAL SECTORS ; - UNDERSTAND THE FUNDAMENTAL CONCEPTS OF CRITERIA OF DESIGN OF SEVERAL EQUIPMENTS AND THEIR USE IN THE AMBIT OF SEVERAL INDUSTRIAL APPLICATIONS, - DEMONSTRATE SKILL IN THE USE OF SOME COMMERCIAL SOFTWARE TO CARRY OUT TECHNICAL AND ECONOMIC FEASIBILITY STUDIES, - DEMONSTRATE CAPACITY FOR READING AND UNDERSTAND OTHER TEXTS ON RELATED TOPICS
3	Prerequisites and learning activities	<p>PREREQUISITES: APPLIED CHEMISTRY, THERMODYNAMICS, MASS AND HEAT TRANSFER OPERATIONS; THE STUDENT MUST KNOW THE NOTIONS OF DESIGN OF CHEMICAL AND BIOCHEMICAL REACTORS WITH THE RELATED DOWNSTREAM UNIT OPERATIONS.</p>
4	Teaching methods and language	<p>LECTURES AND EXERCISES. LANGUAGE: ITALIAN / ENGLISH</p> <p>REF. TEXT BOOKS</p> <p>JAMES EDWIN BAILEY, DAVID F. OLLIS, <i>BIOCHEMICAL ENGINEERING FUNDAMENTALS</i>, Mc GRAW-HILL, 1986</p> <p>SHUICHI AIBA, ARTHUR EARL HUMPHREY, NANCY F. MILLIS, <i>BIOCHEMICAL ENGINEERING</i>, ACADEMIC PRESS, 1973</p> <p>SOME DIDACTIC MATERIALS AND SCIENTIFIC PAPERS PUBLISHED BY THE TEACHER</p>
5	Assessment methods and criteria	<p>WRITTEN AND ORAL EXAMINATION, REALIZATION AND DISCUSSION OF A TECHNICAL REPORT REALIZED BY STUDENTS BEFORE THE FINAL EXAMINATION</p>