

3.0 credits

15.0 h + 15.0 h

1q

Teacher(s) :	Ghislain Michel (compensates Larondelle Yvan) ; Larondelle Yvan (coordinator) ; Ghislain Michel ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	Icampus
Prerequisites :	Introductory courses in microbiology and biochemistry (structure of macromolecules and metabolism)
Main themes :	The course surveys the field of bacterial metabolism linked to food and beverage fermentation. Emphasis is on those catabolic pathways occurring under anaerobic conditions and leading to ATP synthesis by substrate-level phosphorylation. The course also covers recent technologies and scientific developments in academia and industry that contribute to the characterization of starter microorganisms, to the experimental approaches in product and process development and control, and to the study of health-promoting traits.
Aims :	<p>a. Contribution de l'activité au référentiel AA (AA du programme)</p> <p>1.2, 1.4 2.1, 2.2 3.1, 3.7, 3.8 6.1, 6.2, 6.4, 6.5</p> <p>b. Formulation spécifique pour cette activité des AA du programme</p> <p>At the end of this course, students will be able to describe the main metabolic pathways used by bacteria for the degradation of organic compounds and to link the theoretical aspects of bacterial fermentation to a traditional or industrial process in food production and preservation. This ability requires :</p> <ul style="list-style-type: none"> - Understanding of the metabolic reactions in relation to the physiology of the bacteria - Calculation of fermentation balances (carbon recovery and oxydo-reduction balance) and ATP yields - Identification of the metabolic pathways and groups of bacteria by analysing the products generated - Relevance of a fermentative pathway in the food and beverage industry, flavour formation and health promoting aspects - Oral presentation and discussion on topics focusing on food technology and functionality and on microorganism nutritional value - Communication skills in English <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Evaluation methods :	The written examination consists of a series of questions that are selected from a list available on icampus. Concise or detailed answers are required. Assessment criteria include memory, understanding of the enzymatic reactions responsible for ATP synthesis and problems solving ability. The quality of the presentation and the answers to the questions during the seminars are evaluated independently.
Teaching methods :	The theoretical part on the metabolic reactions occurring in bacteria consists of ex cathedra speeches and solved problems. The second part is devoted to bioengineering and functional aspects of fermentation. A list of topics will be given and students, individually or by group of two, will make an oral presentation, in English, on the selected topics. An oral feedback on the presentation is given by the participants.
Content :	The course consists of two 15-h complementary parts: A. The first part describes in details the metabolic pathways used by bacteria to produce lactate, butyrate, propionate, succinate, acetate, ethanol, butanol, butanediol, acetone and methane. Emphasis is on the enzymatic steps not discussed in previous introductory biochemistry courses, on technologies contributing to the characterization of starter microorganisms and on experimental approaches in product and process control. B. Visits to food manufacturers (vinegar production, cheese maturation, ...) or a series of seminars in the thematic areas of digestive flora and volatile fatty acid production, deterioration of foodstuffs, biohydrogenation phenomenon, industrial food processes,
Bibliography :	Slides shown in a classroom will be available via icampus. The course is based on a reference book entitled 'Bacterial metabolism' by G. Gottschalk (ed. Springer). However the purchase of this book is not required. Research publications that are useful for the presentation by the students are available free of charge.
Cycle and year of study :	> Master [120] in Agricultural Bioengineering

Faculty or entity in charge:	AGRO
------------------------------	------