

## MASTER BIOTECHNOLOGIES

### PARCOURS MASTER INTERNATIONAL EN BIOTECHNOLOGIES MARINES

#### semestre 9

#### INGREDIENTS AND ACTIVE MOLECULES

## Bioactive molecules from marine plants biomasses

### Objectifs

The objective is to make the student ready to develop and propose a comprehensive and integrated approach for enhancing the value of marine plants (macroalgae and halophytes) and their by-products for the development of novel added-value molecules and ingredients, intended for food, agrifood, aquaculture, cosmetics, pharmaceutical and medical sectors, together with the sector of fouling.

Marine biotechnologies are targeting niche markets by offering products with low volumes and high added-values, and also mass markets like bio-sourced polymers.

#### 3 crédits ECTS

Volume horaire

Cours Magistral : 20h

Travaux Pratiques : 6h

Travaux Dirigés : 6h

### Pré-requis nécessaires

Basic marine biology, marine biochemistry, botany.

### Compétences visées

Learning outcomes for students are to obtain a comprehensive vision, in a context of sustainable and innovative researches:

- of the macroalgal and halophytes industries at different scales (France, Europe and worldwide)

- on the possibilities to valorize marine plants

- on the application of biotechnological processes in the domain of marine sciences

- on biological assays which could be carried out along the research of innovative marine ingredients

- on the formulation of ingredients.

Students will also acquire:

- the ability to transpose data/concepts of the scientific literature into R & D approaches integrating scaling-up.

- the capacity to bind extractive and purification processes and their uses, depending on the needs of industrials

### Descriptif

Introduction: utilization of marine plants worldwide, chemodiversity and sectors which use marine plants

Chapter 1: Global overview of the marine plants industry in France, Europe and in the world: definitions, types of resources (harvested, cultivated resources together with beaching), markets, value chains, culture versus harvesting following countries with case studies in occidental and oriental countries (for seaweeds).

Chapter 2: The different industrial sectors which use marine plants: general properties, specificities of marine ingredients, classical and innovative uses

Chapter 3: focus on phenolic compounds: extraction, purification, quantification and biological activities, innovative and green processes for their extraction/purification, applications in cosmetic, agrifood and medical industries

Chapter 4: focus on carbohydrates (mono-, di- and polysaccharides): extraction, purification, quantification and biological activities, innovative and green processes for their extraction/purification, applications in cosmetic and medical industries

Chapter 5: focus on marine lipids (terpens, fatty acids,...): extraction, purification, quantification and biological activities, applications in fouling industries and use as natural conservatives.

Chapter 6: innovations in relation with researches on marine plants. Cosmetic Ingredients and formulation: theory and practical way to obtain a cosmetic product.

### Bibliographie

Stengel et al. (2011) Algal chemodiversity and bioactivity: sources of natural variability and implications for commercial application. *Biotechnology Advances* 29: 483-501

Kornprobst (2005) Substances naturelles d'origine marine : Chimiodiversité, pharmacodiversité, biotechnologies, Tec & Doc

Fleurence & Levine (2016) Seaweed in Health and Disease Prevention, 1st Edition. ISBN: 9780128027721

Se-Kwon (2012) Handbook of Marine Macroalgae: Biotechnology and Applied Phycology, Wiley-Blackwell. ISBN: 9780470979181

Anonyme (2011) Récolte des algues de rive. Guide de bonnes pratiques. Inter Bio Bretagne (IBB). Accessible en ligne : <http://www.bio-bretagne-ibb.fr/wp-content/uploads/IBB-Guide-recolte-algues-29122013.pdf>

## Modalités de contrôle des connaissances

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### Session 1 ou session unique - Contrôle de connaissances

Nature de l'enseignement	Modalité	Nature	Durée (min.)	Coefficient	Remarques
	CT	Ecrit - rapport		50%	
	CT	Oral - exposé	20	50%	par groupe de 2 ou 3