GHENT UNIVERSITY

Course Specifications

From the academic year 2020-2021 up to and including the academic year

Biotechnological Potential of Marine Microorganisms (C004326)

Due to Covid 19, the education and assessment methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size *(nominal values; actual values may depend on programme)*

Credits 3.0 **Study time 75 h** **Contact hrs** 32.0h

Course offerings in academic year 2021-2022

A (semester 1) English Gent

Lecturers in academic year 2021-2022

Le Blay, Gwenaelle	BREST02	lecturer-in-charge
Burgaud, Gaetan	BREST02	co-lecturer
Hellio, Claire	BREST02	co-lecturer
Jebbar, Mohamed	BREST02	co-lecturer
Meslet, Laurence	BREST02	co-lecturer

Offered in the following programmes in 2021-2022	**crdts**	**offering**
International Master of Science in Marine Biological Resources	3	A

Teaching languages

English

Keywords

Position of the course

The main objective of this course is to provide students with general information for better understanding the biotechnological potential of marine heterotrophic microorganisms. The unit will focus on acquiring a broad knowledge on the biodiversity and physiology of marine microorganisms, in order to target specific populations according to the desired industrial applications. Molecular tools applied to data mining will be presented. New strategies for the screening, isolation and culture of marine heterotrophic microorganisms as well as the production of biomass and/or metabolite in bioreactors will be also described. This unit will be illustrated by different research projects using marine microorganisms for biotechnological applications.

Contents

Chapter 1: Presentation of the huge diversity of heterotrophic marine microorganisms focusing on the link between biodiversity (adaptation to different habitats, metabolism, communication/interaction..) and their potential biotechnological applications (4h G Le Blay)
Chapter 2 : Presentation of innovative approaches used for marine heterotrophic microorganism isolation (dilution to extinction, micro-encapsulation, optical tweezers, diffusion chambers etc..) and culture (high throughput cultural techniques and design of culture media) (4h G Le Blay)
Chapter 3 : Screening methodologies (cultural and molecular techniques) used for industrial targets (antimicrobial, antifouling, polyhydroxyalkanoate...) (4h C Hellio)
Chapter 4 : Presentation of the basic principles of marine microbial biomass and metabolite production (bioreactor design and operation modes, yields and stoichiometry) (4h G Le Blay)
Chapter 5 : Presentation of examples of research applications for the industries with the use of marines microorganisms or metabolites (biofouling, -Presentation of examples of research applications for the industries with the use of marines microorganisms or metabolites (biofouling, exopolysaccharides, polyhydroxyalkanoates..) (8h C Hellio, C Simon-Colin)
Chapter 6 : Presentation of molecular tools (data mining..) for biotechnological applications (8h M Jebbar, G Burgaud, L Meslet)

Initial competences

Basic knowledge on microbial structure, growth and physiology (practical and theoretical)

Final competences

1 Students will be aware of the huge diversity of marine heterotrophic micro-organisms.
2 Students will understand the link between biodiversity, microbial physiology and potential biotechnological applications.
3 Students will have a basic knowledge on the use of molecular tools for biotechnological applications.
4 Students will have a thorough knowledge of innovative approaches used for the isolation and culture of marine heterotrophic microorganisms.
5 Students will know the basic principles of biomass and metabolites production in bioreactors.
6 Students will be aware of the classically used screening methods.
7 Students will have examples of research applications for the industries with the use of marines microorganisms or metabolites.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Extra information on the teaching methods

The course will be held in form of lectures and practical exercises

Learning materials and price

References

New approaches for bringing the uncultured into culture. S L'Haridon, GH Markx, CJ Ingham, L Paterson, F Duthoit & G Le Blay. In The marine microbiome – an untold resource of biodiversity and biotechnological potential Editors: L.J. Stal & M.S. Cretoiu Publisher: Springer 2016
Screening microorganisms for bioactive compounds. S Giubergia, C Schleissner, F de la Calle, Pretsch, D Pretsch, L Gram & MS Thøgersen. In The marine microbiome – an untold resource of biodiversity and biotechnological potential Editors: L.J. Stal & M.S. Cretoiu Publisher: Springer 2016
Exploring the microbiology of the deep sea. M Jebbar, P Vannier, G Michoud & VT Marteinsson. In The marine microbiome – an untold resource of biodiversity and biotechnological potential Editors: L.J. Stal & M.S. Cretoiu Publisher: Springer 2016

Marine fungi. V Rédou, M Vallet, L Meslet-Cladière, A Kumar, KL Pang, YF Pouchus, G Barbier, O Grovel, S Bertrand, S Prado, C Roullier & G Burgaud. In The marine microbiome – an untold resource of biodiversity and biotechnological potential Editors: L.J. Stal & M.S. Cretoiu Publisher: Springer 2016
Entrapment of anaerobic thermophilic and hyperthermophilic marine microorganisms in a gellan/xanthan matrix. Landreau M, Duthoit F, Claeys-Bruno M, Vandenabeele-Trambouze O, Aubry T, Godfroy A, Le Blay G. J Appl Microbiol. 2016 Mar 1.

Discovery of a mcl-PHA with unexpected biotechnical properties: the marine environment of French Polynesia as a source for PHA-producing bacteria. Wecker P, Moppert X, Simon-Colin C, Costa B, Berteaux-Lecellier V. AMB Express. 2015 Dec;5(1):74.

Meslet-Cladiere, L., Delage, L., Leroux, C.J., Goulitquer, S., Leblanc, C., Creis, E., Gall, E.A., Stiger-Pouvreau, V., Czjzek, M., and Potin, P. (2013). Structure/Function analysis of a type III polyketide synthase in the brown alga Ectocarpus siliculosus reveals a biochemical pathway in phlorotannin monomer biosynthesis. Plant Cell 25, 3089-3103.

Course content-related study coaching

Assessment moments

Examination methods in case of periodic assessment during the first examination period

Examination methods in case of periodic assessment during the second examination period

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Calculation of the examination mark