GHENT UNIVERSITY

Course Specifications

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

Labs in Biotechnology (C004250)

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 6.0 **Study time 168 h** **Contact hrs** 50.0h

Course offerings in academic year 2021-2022

A (semester 1) English Gent

Lecturers in academic year 2021-2022

Power, Deborah FAR001 lecturer-in-charge

Offered in the following programmes in 2021-2022	**crdts**	**offering**
International Master of Science in Marine Biological Resources	6	A

Teaching languages

English

Keywords

Hand-on laboratory-based training, Project driven biotechnology labs, Green Biotech, Blue Biotech

Position of the course

Contents

This course is designed to educate technically competent students and prepare them with applied bioscience skills for an academic or industrial environment. It aims to provide students with laboratory skills in biotechnology and provide them with theoretical knowledge that can be linked to practical situations stimulating independent work. The students are provided with protocols and then develop their work, managing their time and identifying potential problems and solutions. The course is in the scope of biotechnology and integrates multidisciplinary approaches to problem solving including a wide range of fields: biology, chemistry, microbiology, mathematics and biochemistry. It will provide students motivation to translate knowledge to beneficial applications to advance new horizons in the BLUE and GREEN BIOTECH fields.
The course is divided in two modules and the concepts underlying I-Recombinant protein production and functional elucidation, including proteomics (the generation of recombinant target proteins) and in vitro cell culture assays (for screening protein functions); II- Plant bioactive compounds analysis, including extraction, quantification and evaluation of biological functions, are developed. Students will work in small teams and carry out the work plan autonomously and discuss the methodological approach, their results, failures and solutions. Skill level is established in informal tutorials that precede the practical exercise.

Initial competences

1 Knowledge and examples of blue biotech and green biotech and their contribution to sustainability;
2 Competence in key skills in plant biotechnology and blue/industrial biotechnology;
3 Understand the importance of the practical methods and Biotechnological approaches in and their application to specific problems;
4 Link theoretical knowledge to resolve practical problems in a hands-on situation;
5 Acquire basic security and biosafety rules in laboratorial environment.

Final competences

1 Understanding of the scope of biotechnology and the meaning of sustainability.
2 Development of bibliographic search skills to solve practical problems and/or to improve understanding of the methods used.

3 Capacity to critically reflect on experimental data and the results obtained, and identify problems and propose strategies for their resolution.
4 Elaborate a scientific report with the results obtained organized, present and discussed in a clear and objective way.
5 At the end of this curricular unit students should be better prepared to develop lab work autonomously. Also, the evaluation requires that students establish basic notions about preparation of a scientific report and develop scientific communication and discussion skills.

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

Practicum, Group work, Guided self-study, Seminar, Lecture

Learning materials and price

- No additional cost
- Protocols, lectures and manuals are made available through the tutorial platform.
- Students are encouraged to use on-line resources from the Web of Knowledge or similar bibliographic databases.

References

- Rosano GL., et al.Recombinant protein expression in Escherichia coli: advances and challenges. Front Microbiol. 2014; 5:172.
  Uhoraningoga A., et al. The Goldilocks Approach: A Review of Employing Design of Experiments in Prokaryotic Recombinant Protein Production. Bioengineering (Basel). 2018 ;5 (4). pii: E89. doi: 10.3390/bioengineering5040089
- Recombinant Protein Purification Handbook Principles and Methods. Handbook from GE Healthcare Lifesciences, 2009.
- Protein sample preparation. Handbook from GE Healthcare Lifesciences, 2014. Affinity Chromatography-Tagged Proteins. Handbook from GE Healthcare Lifesciences, Volume 2, 2016.
- Proteins1.3 Efficient Strategies for Production of Eukaryotic Proteins. Comprehensive Biophysics, Volume 1, 2012, Pages 4-33 J.D.
  Freshney RI (2010) Culture of Animal cells: A manual of basic technique and specialized applications, 6th Edition, Wiley-Blackwell - John Wiley & Sons, Lda, ISBN: 978-0-470-52812-9.
- Cell Culture Basics Handbook (2016) GibcoTM Education © Thermo Fisher Scientific Inc.
- Crozier A, Clifford MN, Ashiara H. (2006) Secondary Metabolites. Occurrence, Structure and Role in the Human Diet, Blackwell Publishing Lda. ISBN: 13_ 978-1-4051-2509-3.
- Dewick PM (2009) Medicinal Natural Products. A Biosynthetic Approach, 3th Edition, John Wiley & Sons, Lda, ISBN: 978-0-470-74168-9

- Chandra, Suman, Latta, Hermant, Varma, Ajit (2013) Biotechnology for Medicinal Plants, Springer, ISBN: 978-3-642-29974-2.

Course content-related study coaching

Tutorials are provided as requested for coaching or problem resolution. 2h per week are set aside for resolution of problems students may have.

Assessment moments

continuous assessment

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

Report, Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

Periodic evaluation is carried out at the end of the 3 modules
1 Plant bioactive compounds
2 Protein structure and function
3 Cell culture and biosensors
For evaluation of each module a practical report is presented and a seminar is given to present the work executed. The final mark is the average of the results from the 3 modules (40% scientific report: 40% laboratory work: 20% presentation and capacity to answer questions)

Calculation of the examination mark

The final discipline mark comes from the average of the marks obtained in the three module that compose the discipline.
Each module has 3 elements of evaluation
1 performance in the laboratory (40%);
2 scientific report (40%);
3 public seminar to present the results (20%)