

## Chemical Biology (C004135)

**Cursusomvang** *(nominale waarden; effectieve waarden kunnen verschillen per opleiding)*

**Studiepunten 4.0** **Studietijd 120 u**

**Aanbodsessies en werkvormen in academiejaar 2023-2024**

A (semester 2) Engels Gent hoorcollege

**Lesgevers in academiejaar 2023-2024**

Savvides, Savvas	WE10	Verantwoordelijk lesgever
Devos, Simon	GE31	Medelesgever
Impens, Francis	GE31	Medelesgever
Madder, Annemieke	WE07	Medelesgever

**Aangeboden in onderstaande opleidingen in 2023-2024**

	stptn	aanbodsessie
<a href="#">Educatieve Master of Science in de wetenschappen en technologie (afstudeerrichting chemie)</a>	4	A
<a href="#">Master of Science in Chemistry (afstudeerrichting (Bio)Organic and Polymer Chemistry)</a>	4	A
<a href="#">Uitwisselingsprogramma chemie (niveau master)</a>	4	A

**Onderwijstalen**

Engels

**Trefwoorden**

genomics, proteomics, post-genomic applications, screening methods, biophysical methods, chemical regulation, structural biology, structure-based methods in drug discovery, protein engineering, protein synthesis and modification, protein structure and function control, nucleic acid technologies in research, diagnostics and therapeutics

**Situering**

To acquire knowledge on how to use chemical principles in a biochemical context. The students will learn how to use their present knowledge on organic chemistry, analytical techniques, spectroscopic techniques, thermodynamics, modelling, structure of proteins, reaction mechanisms and kinetics, metabolism etc. in order to obtain a better understanding of biological processes and the interactions of macromolecules with ligands.

**Inhoud**

- General introduction to OMICS technologies
- Mass spectrometry-based proteome analysis
- Quantitative proteomics and targeted proteomics
- Analysis of protein phosphorylation events
- Analysis of modifications occurring on lysines
- Proteomics of subcellular fractions
- Activity-based proteomics => chemical tagging and profiling of active enzymes
- Target production: overview of recombinant protein expression systems.
- Assays and screening methods for studying protein binding and enzymatic activities
- Structure-based approaches to rational drug design and molecular design
- Thermodynamic and kinetic parameters governing binding events, e.g. in protein-protein interactions, protein-ligand interactions.
- Controlling protein-protein interactions using chemical inducers and disruptors of dimerisation
- Engineering control over protein function using chemistry: how to synthesize a

protein containing unnatural amino acids, labeling of proteins and peptides

### **Begincompetenties**

The student should have obtained a credit for the following courses: "General Biochemistry: Proteins!", "Chemistry I: Structure of Matter", "Chemistry II: Changes in Matter", "Physical Chemistry I: Chemical Thermodynamics", "Introduction to Organic Structures", "Organic Chemistry: Reactivity 1", "Organic Chemistry: Reactivity 2", "Organic Chemistry: Reactivity 3", "Structural analysis", "Synthetic Methods in Organic Chemistry", "Analytical Chemistry: Principles" and "Analytical Separation Methods" or should have acquired the envisaged competences through equivalent courses - demonstrated through credits.

### **Eindcompetenties**

- 1 Knowledge on the possibilities of proteomics technologies for the analysis chemical biology research questions.
- 2 Insight in chemical application of post-genomic information.
- 3 Knowledge on the design and use of markers and labels for the visualisation of biological processes.
- 4 Knowledge of several biophysical methods for the study of biochemical interactions involving small molecules interacting with biomolecules.
- 5 Knowledge on the chemical regulation of biosynthetic pathways.
- 6 Knowledge on the current methods for synthetic nucleic acid and protein production and production hosts.
- 7 Knowledge on the different methods for protein synthesis and modification.
- 8 Knowledge on chemical tools for studying protein structure and function.
- 9 Knowledge on methods for studying and controlling protein protein interactions.
- 10 Knowledge on chemical ligation methodologies.
- 11 Critical analysis and understanding of a relevant recent research topic as lectured upon by a specialist researcher in the field.

### **Creditcontractvoorwaarde**

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

### **Examencontractvoorwaarde**

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

### **Didactische werkvormen**

Hoorcollege

### **Toelichtingen bij de didactische werkvormen**

Omwille van COVID19 kunnen gewijzigde werkvormen uitgerold worden indien dit noodzakelijk blijkt.

Use of the Electronic Learning Environment (ELE: <https://ufora.ugent.be/d2l/home>): articles and extra material are on-line available.

### **Leermateriaal**

Copies of slides, English notes and literature references. Estimated cost: 10 EUR  
ELE: Documents available on Ufora

### **Referenties**

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### **Vakinhoudelijke studiebegeleiding**

Possibility for discussion and questions following each lecture and on appointment.

### **Evaluatiemomenten**

periodegebonden evaluatie

### **Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode**

Schriftelijke evaluatie met open vragen

### **Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode**

Schriftelijke evaluatie met open vragen

### **Evaluatievormen bij niet-periodegebonden evaluatie**

### **Tweede examenkans in geval van niet-periodegebonden evaluatie**

Niet van toepassing

**Eindscoreberekening**

Periodic evaluation (100%).