

Asymmetric Synthesis (C004134)

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

Studiepunten 4.0

Studietijd 105 u

Aanbodsessies en werkvormen in academiejaar 2024-2025

A (semester 2)

Engels

Gent

hoorcollege
practicum

Lesgevers in academiejaar 2024-2025

Hennecke, Ulrich

VUB

Verantwoordelijk lesgever

Aangeboden in onderstaande opleidingen in 2024-2025

stptn

aanbodssessie

Educatieve Master of Science in de wetenschappen en technologie (afstudeerrichting chemie)

4

A

Master of Science in Chemistry (afstudeerrichting (Bio)Organic and Polymer Chemistry)

4

A

Onderwijstalen

Engels

Trefwoorden

Stereochemistry; Diastereoselectivity; Enantioselectivity; Chiral Auxiliary; Asymmetric Catalysis; Transition Metal Catalysis; Enzyme Catalysis

Situering

The course provides insight into the synthesis of enantiopure compounds

Inhoud

Theory (HOC):

This course deals with advanced topics within the field of asymmetric synthesis with special emphasis on modern catalytic enantioselective methods. The following topics are discussed:

- Chapter 1: General Principles of Stereochemistry
- Chapter 2: Additions to C=O Bonds
- Chapter 3: Enolat chemistry
- Chapter 4: Asymmetric Aldol reactions
- Chapter 5: Asymmetric Reduction
- Chapter 6: Asymmetric Additions to C=C Bonds
- Chapter 7: Miscellaneous Asymmetric Reactions
- Chapter 8: Biocatalytic approaches to Asymmetry Synthesis

Practical laboratory exercise (WPO)

In the laboratory exercise the students will carry out a catalytic, enantioselective transformation such as a catalyzed addition of diethyl zinc to an aldehyde or an organocatalytic Diels-Alder reaction catalyzed by MacMillan's catalyst. This is followed by determination of the enantiomeric ratio using an appropriate method such as gas chromatography on a chiral phase. The experiment will be documented in a written report including analysis of the stereoselectivity.

Begincompetenties

General understanding of organic chemistry and organic reaction mechanisms.

Eindcompetenties

- 1 The student has good knowledge of the methods and principles of asymmetric synthesis including insight in the reaction mechanisms in the field of asymmetric synthesis.
- 2 The student is able to design and execute the synthesis of enantiopure, chiral

molecules and has the ability to understand and follow the scientific literature in the field of asymmetric synthesis.

Creditcontractvoorwaarde

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

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Hoorcollege, Practicum

Studiemateriaal

Geen

Referenties

Course material:

- (recommended) Organic Chemistry, Clayden , Greeves & Warren, Oxford Univ. Press; 2nd Edition 2012
- Additional course material will be available on the learning platform (powerpoint slides).

Possible other literature (not necessary):

- March's Advanced Organic Chemistry, Michael B. Smith, Wiley, 7th Ed. 2013
- Advanced Organic Chemistry, Carey and Sundberg, Springer, 5th Ed. 2007
- Classics in Stereoselective Synthesis, Erick M. Carreira and Lisbet Kvaerno, Wiley, 1st Edition, 2009
- Asymmetric Synthesis: The Essentials Mathias Christmann and Stefan Bräse, 2nd Edition, Wiley, 2007

Vakinhoudelijke studiebegeleiding

Discussion of problems is possible after each course, or upon individual appointment.

Evaluatiemomenten

periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Mondelinge evaluatie

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Mondelinge evaluatie

Evaluatievormen bij niet-periodegebonden evaluatie

Tweede examenkans in geval van niet-periodegebonden evaluatie

Niet van toepassing

Eindscoreberekening

ORAL EXAM: 85% of the final grade; Laboratory exercises: 15% of the final grade (based on the exercises and a written report) (All categories need to be fulfilled in order to be eligible for obtaining a final grade)
scale from 0 to 20