Level: master

Course title: Gas chromatographic analysis of natural products (IB-509)

Status: elective

ECTS: 6

Requirements: none

Learning objectives:
To provide students with advanced knowledge in gas chromatography, with focus on application in natural products qualitative and quantitative analysis. To develop students' practical skills in development and application of GC methods in solving biochemical problems.

Learning outcomes
After completing the course, a student is able to: (1) describe the fields of use of gas chromatography in modern biochemical and biomedicinal investigations, (2) demonstrate advanced knowledge of GC hardware and parameters, and their effects on analysis results, (3) independently select, adapt and develop new chromatographic methods for solving biochemical problems, (4) perform GC-specific laboratory procedures and techniques, (5) perform data analysis and critically evaluate results of GC-MS analysis.

Syllabus
Theoretical instruction
Fundamentals of chromatography. Gas chromatography – principles, instruments. GC detectors – principles, comparison, limitations. Basic EI and CI mass spectrometry. Qualitative GC-MS analysis. Fragmentation mechanisms of selected compound classes. Spectral libraries. Sample preparation for GC (incl. headspace, SPE, SPME) – specific requirements and limitations. Artifacts in GC analysis. Quantitative GC analysis. Development and validation of GC methods. GC in natural products analysis. Essential oils analysis. Retention indices. Chemometrics in chromatography – PCA, chemotaxonomy. Analysis of other natural product classes (nitrogen and sulphur compounds, phenols, sugars, lipids). Chemical derivatization. Trends in GC (chiral GC, GC×GC, GC-MS^n, preparative GC).

Practical instruction
Familiarization with GC-MS instrument and software. Essential oil preparation and qualitative GC-MS analysis. Calculation of Kovats indices, spectral deconvolution. Development of method for quantitative determination of selected compounds. Analysis of sulfur compounds in plant material by headspace GC-MS. Analysis of phenolics and lipids by derivatization.

Weekly teaching load				Other:
Lectures: 2	Exercises: 2	Other forms of teaching:	Student research:	