

Module	Small Active Molecules
Code	V3_1
Degree Programme	Master of Science in Life Sciences (MSLS)
ECTS Credits	4 ECTS
Workload	Total 120 h: Contact 60 h; Self-study 60 h
Module Coordinator	<p>Name Prof. Dr. Rainer Riedl Phone +41 (0)58 934 56 18 Email rainer.riedl@zhaw.ch Address ZHAW Zürcher Hochschule für Angewandte Wissenschaften Life Sciences and Facility Management Campus Reidbach Postfach CH-8820 Wädenswil</p> <p>x The coordinator is also a lecturer</p>
Lecturers	<ul style="list-style-type: none"> • Dr. Stefan Höck • Guest speakers
Entry Requirements	B.Sc. level of Chemistry, in particular of Organic Chemistry (basic reaction mechanisms, knowledge of functional groups in Organic Chemistry)
Learning Outcomes and Competences	<p>After completing the module students will be able to</p> <ul style="list-style-type: none"> • evaluate new synthesis technologies such as solid phase synthesis, microreactors, microwave chemistry and combinatorial chemistry • understand small active molecules in biological context • understand the basics of medicinal chemistry and drug discovery • recognize catalysis as a tool in chemistry and biological chemistry • employ the most important 1D- and 2D NMR experiments and NMR pulse sequences used in structure analysis • understand the principles and applications of the Nuclear Overhauser Effect • evaluate the principles of the analysis and separation of chiral molecules • recognize X-ray crystallography as a tool for structure elucidation • understand the principles of cheminformatics, computational chemistry and molecular modelling for the design and discovery of small active molecules
Module Content	<p>This module is concerned with the design, preparation, analysis, and the application of small molecules.</p> <p>This includes new synthetic methods such as microwave assisted synthesis and combinatorial synthesis as well as structural analysis by NMR. The applications cover medicinal chemistry and bio-inspired organic synthesis, whereas computational chemistry concepts cover the design of novel small active molecules.</p> <p>The learning outcomes of the different disciplines and topics are interconnected. The design of novel small active molecules is covered by computational chemistry concepts such as:</p> <ul style="list-style-type: none"> • Molecular modelling

	<ul style="list-style-type: none"> • Cheminformatics <p>The synthesis of small molecules is covered by new synthetic methodologies such as:</p> <ul style="list-style-type: none"> • Solid phase and combinatorial chemistry • Microreactors and Microwave chemistry • Organocatalysts <p>As a modern application of small molecules in the life science industry, medicinal chemistry gets taught including:</p> <ul style="list-style-type: none"> • Introduction to drugs and their action • SAR approaches to drug design, docking experiments • Basics of pharmacokinetics and drug metabolism • Drug development and production <p>Besides the synthetic topics of this module, the analytical sciences of small organic molecules are covered by:</p> <ul style="list-style-type: none"> • Analytical determination of structures: 2D NMR methods, NOE experiments and their physical background • Methods to determine the relative and absolute configurations of molecules • Separation and analysis of enantiomers
Teaching / Learning Methods	<ul style="list-style-type: none"> • Lectures ~50% • Self-study ~30% • Guided exercises ~10% • Practical study in groups of two persons ~10%
Assessment of Learning Outcome	<ul style="list-style-type: none"> • Written / oral examinations • The performance in these examinations will count 25% each towards the module grade.
Bibliography	<ul style="list-style-type: none"> • Klebe G., Wirkstoffdesign, Spektrum Akademischer Verlag, 2009. • Bannwarth W., Hinzen B., Combinatorial Chemistry, Wiley-VCH, 2006. • Kappe O., Stadler A., Microwaves in Organic and Medicinal Chemistry, Wiley-VCH, 2005. • Ehrfeld W., Hessel V., Löwe H., Microreactors, Wiley-VCH, 2000. • Leach R., Gillet V. J., An Introduction to Chemoinformatics, Springer, 2007. • Leach R., Molecular Modelling: Principles and Applications, 2nd Edition, Pearson Education Limited, 2001. • Bachrach S. M., Computational Organic Chemistry, Wiley, 2007. • Selected book-chapters and articles.
Language	German and/or English
Comments	-
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