Module: Instrumental Analysis for Structure Assignment in Organic Chemistry	
University/department/institute: Freie Universität Berlin/Department of Biology, Chemistry and Pharmacy/Institute of Chemistry and Biochemistry	
Responsible for the module: module lecturers	
Admission requirements: none	
Qualification aims: The students can apply modern analytical processes to the structure assignment of organic compounds and to analyze reaction mechanisms and can analyze the data. They know the principles of the technical instruments and measurement methods and can select the appropriate experiments for a wide range of scientific issues, estimating their performance and limitations. They can independently evaluate the data quality and interpret the measurement results.	
Content: Structure assignment of organic compounds using NMR, IR, UV and CD spectroscopy and mass spectrometry including chromatography processes (HPLC, GC); theoretical and technical principles of the instruments; measuring principles; pulse sequences for NMR experiments such as NOE, NOESY, ROESY, COSY, EXSY, DOSY, HMBC, HMQC and temperature-dependent NMR for structural analysis; signal assignment; evaluation of dynamic processes; application fields and limitations of a range of MS ionization processes such as EI, CI, APCI, ESI, MALDI, FAB, FD/LIFDI, DART and MS analyzers such as TOF, sector field, quadrupole, ion trap, FTICR, Orbitrap, ICPMS; chemistry in the highly diluted gas phase (CID, IRMPD, ECD, H/D exchange); practical tasks (preparing samples, carrying out simple measurements, presenting complicated experiments, evaluation and data interpretation, problem sets)	

Teaching and learning units	**Attendance** (Semester hours per week = SH)	**Forms of active participation**	**Study time** (hours)	
Lecture	2	-	Attendance L Preparation and follow-up L	30 30
Tutorial	2	Experiments using the institute's equipment, contributions to discussion, working on problem sets	Attendance T Preparation and follow-up T Examination preparation, examination	30 30 30

Language of instruction	German or English	
Compulsory regular attendance	Lecture: attendance recommended; tutorial: yes	
Study time, total hours	150 hours	5 CP
Duration of module	One semester	
Module offered	Every winter semester	
Application	Master's program in Chemistry	