

HEVESY GYÖRGY PHD SCHOOL OF CHEMISTRY

Faculty of Science

Discipline: science

Form of education: PhD training

Objectives of the Program: acquire higher-level academic training and the skills necessary in research, development, innovation, and higher-level education

Length of training: 8 semesters

Training type: regular school

Financing: state sponsored or tuition-fee based

Entrance requirements: MSc and a successful entrance exam

Language requirements: a type „C” secondary (or equivalent) language exam in English recognized by the state (entrance requirement) and a basic-level second language exam of similar status (exit requirement)

Training phases: First two years (period I): 120 ECTS credits, finished with a complex exam; Last two years (period II): 120 ECTS credits, finished with an absolutorium

Number of ECTS credits required: 240

Moduls of ECTS credits: training credit (I: 36-48; II: 0), research credit (I: 60, II: 114), and teaching credit (I: 0-12), report days (I:12, II:6)

Person responsible for the training: Dr. Attila G. Császár, professor of chemistry, head of the PhD School

DOCTORAL SCHOOL'S EDUCATION PROGRAMS

I. SYNTHETIC, ORGANIC AND BIOMOLECULAR CHEMISTRY

Head of the program: Prof. Dr. András Perczel

II. THEORETICAL, PHYSICAL, AND STRUCTURAL CHEMISTRY

Head of the program: Dr. Ágnes Szabados

III. ANALYTICAL CHEMISTRY, MATERIALS SCIENCE, ELECTROCHEMISTRY, COLLOIDAL AND ENVIRONMENTAL CHEMISTRY

Head of the program: Prof. Dr. Imre Salma

Compulsory courses:

KÉM/REP1 Report Day

6 credits, practice, optional, no repetition (during the 2nd semester)

KÉM/REP2 Report Day

6 credits, practice, optional, no repetition (during the 4th semester)

KÉM/REP3 Report Day

6 credits, practice, optional, no repetition (during the 6th semester)

KÉM/RES1 Supervised research

15 credits, practice, optional, no repetition (during the 1st semester)

KÉM/RES2 Supervised research

15 credits, practice, optional, no repetition (during the 2nd semester)

KÉM/RES3 Supervised research

15 credits, practice, optional, no repetition (during the 3rd semester)

KÉM/RES4 Supervised research

15 credits, practice, optional, no repetition (during the 4th semester)

KÉM/RES5 Supervised research

30 credits, practice, optional, no repetition (during the 5th semester)

KÉM/RES6 Supervised research

24 credits, practice, optional, no repetition (during the 6th semester)

KÉM/RES7 Supervised research

30 credits, practice, optional, no repetition (during the 7th semester)
KÉM/RES8 Supervised research
30 credits, practice, optional, no repetition (during the 8th semester)

The dissertation part of the complex exam is a lecture presented on the Report Day of the PhD School. The theoretical part of the complex exam has two components. The compulsory component of the theoretical part of the complex exam is a proposal writing on a selected subject following a given form. The topic of the proposal should not be related directly to the actual research project of the student. The optional component of the theoretical part of the complex exam is a subject selected from the following list:

SYNTHETIC, ORGANIC AND BIOMOLECULAR CHEMISTRY PROGRAM

1. Organic chemistry
2. Inorganic chemistry
3. Polymer chemistry

THEORETICAL, PHYSICAL, AND STRUCTURAL CHEMISTRY PROGRAM

1. Physical chemistry
2. Methods of structure analysis
3. Theoretical chemistry

**ANALYTICAL CHEMISTRY, MATERIALS SCIENCE, ELECTROCHEMISTRY,
COLLOIDAL AND ENVIRONMENTAL CHEMISTRY**

1. Analytical chemistry
2. Electrochemistry
3. Colloidal chemistry
4. Nuclear chemistry
5. Environmental chemistry

Training modul (credits to be obtained: 48):

Optional courses:

KÉM/TEACH1	Teaching activity 6 credits, practice, optional, can not be repeated
KÉM/TEACH2	Teaching activity 6 credits, practice, optional, can not be repeated
KÉM/201	Computational statistical mechanics András Baranyai 6 credits, theory, optional, no repetition
KÉM/206	Ring transformations in heterocyclic chemistry Antal Csámpai 6 credits, theory, optional, no repetition
KÉM/207	Quantum chemistry and structural determinations, advanced Attila Császár 6 credits, theory, optional, no repetition
KÉM/208	Quantum mechanics of molecular motions Attila Császár 6 credits, theory, optional, no repetition
KÉM/212	Quantum chemical molecular modeling Ödön Farkas 6 credits, theory, optional, no repetition
KÉM/215	Electrostatic interactions in colloid systems Tibor Gilányi 6 credits, theory, optional, no repetition

KÉM/216	Self-association of surfactants in solution Tibor Gilányi 6 credits, theory, optional, no repetition
KÉM/218	Heteroaromatic chemistry Antal Csámpai and Szilárd Varga 6 credits, theory, optional, no repetition
KÉM/223	Bioconjugates Ferenc Hudecz 6 credits, theory, optional, no repetition
KÉM/224	Selected chapters of peptide and protein chemistry Ferenc Hudecz 6 credits, theory, optional, no repetition
KÉM/226	Theoretical electrochemistry György Inzelt 6 credits, theory, optional, no repetition
KÉM/227	Basics of macromolecular technology Béla Iván 6 credits, theory, optional, no repetition
KÉM/228	Principles of molecular engineering of macromolecules Béla Iván 6 credits, theory, optional, no repetition
KÉM/232	Basic neurochemistry Julianna Kardos 6 credits, theory, optional, no repetition
KÉM/233	Methods of applied statistics Erő Keszei 6 credits, theory, optional, no repetition
KÉM/234	Modern reaction kinetics Erő Keszei 6 credits, theory, optional, no repetition
KÉM/235	Surface chemistry of biomaterials Éva Kiss 6 credits, theory, optional, no repetition
KÉM/239	Organometallic compounds in the organic synthesis András Kotschy 6 credits, theory, optional, no repetition
KÉM/240	Modern synthetic methods András Kotschy 6 credits, theory, optional, no repetition
KÉM/241	Theoretical background of experimental electrochemistry Győző Láng 6 credits, theory, optional, no repetition
KÉM/242	Introduction to the theory of elementary reaction kinetics György Lendvay 6 credits, theory, optional, no repetition
KÉM/246	Shape, similarity and complementarity of molecules Pál Mezey 6 credits, theory, optional, no repetition
KÉM/247	Preparation of cyclo- and oligopeptides Gábor Mező 6 credits, theory, optional, no repetition
KÉM/251	Structure elucidation of peptides and proteins by NMR spectroscopy András Perczel 6 credits, theory, optional, no repetition
KÉM/252	Bio-NMR pulse sequences

	András Perczel
	6 credits, theory, optional, no repetition
KÉM/254	Methods of quantum chemistry
	Gábor Pongor
	6 credits, theory, optional, no repetition
KÉM/255	Modern methods of quantum chemistry
	Gábor Pongor
	6 credits, theory, optional, no repetition
KÉM/256	Disorder in condensed phases
	László Pusztai
	6 credits, theory, optional, no repetition
KÉM/257	Organofluorine chemistry
	József Rábai
	6 credits, theory, optional, no repetition
KÉM/260	Physical organic chemistry
	Elemér Vass
	6 credits, theory, optional, no repetition
KÉM/261	Instrumental nuclear methods applied in environmental analysis
	Imre Salma
	6 credits, theory, optional, no repetition
KÉM/266	Applied NMR spectroscopy
	Andrea Bodor
	6 credits, theory, optional, no repetition
KÉM/268	Mathematical methods in quantum chemistry I.
	Péter Surján
	6 credits, theory, optional, no repetition
KÉM/269	Mathematical methods in quantum chemistry II.
	Péter Surján
	6 credits, theory, optional, no repetition
KÉM/272	Modern methods of quantum chemistry
	Péter Szalay
	6 credits, theory, optional, no repetition
KÉM/274	Application of photoionization in spectroscopy
	László Szepes
	6 credits, theory, optional, no repetition
KÉM/275	Organometallic chemistry
	Roland Szalay
	6 credits, theory, optional, no repetition
KÉM/277	Investigation of metal corrosion by electrochemical methods
	Laura Sziráki
	6 credits, theory, optional, no repetition
KÉM/279	Applied gas chromatography
	Zsuzsanna Eke
	6 credits, theory, optional, no repetition
KÉM/280	Separation techniques in organic chemistry
	Zsuzsanna Eke
	6 credits, theory, optional, no repetition
KÉM/282	Combustion chemistry and physics
	Tamás Turányi
	6 credits, theory, optional, no repetition
KÉM/283	Investigation of reaction mechanisms
	Tamás Turányi
	6 credits, theory, optional, no repetition
KÉM/284	Applied computer simulations
	László Túri

KÉM/285	6 credits, theory, optional, no repetition Elementary reaction dynamics László Túri
KÉM/286	6 credits, theory, optional, no repetition Mass spectrometry II. László Drahos
KÉM/287	6 credits, theory, optional, no repetition Nuclear techniques in material science Zoltán Homonnay
KÉM/288	6 credits, theory, optional, no repetition Analytical application of plasma spectroscopy Gyula Záray
KÉM/289	6 credits, theory, optional, no repetition Environmental analysis Gyula Záray
KÉM/290	6 credits, theory, optional, no repetition Enrichment methods in atomic spectroscopy Katalin Perényi
KÉM/292	6 credits, theory, optional, no repetition Vacuum techniques Dávid Frigyes
KÉM/293	6 credits, theory, optional, no repetition Basic and applied quantum chemistry Ágnes Szabados
KÉM/296	6 credits, theory, optional, no repetition Photophysics and photochemical kinetics Attila Demeter
KÉM/298	6 credits, theory, optional, no repetition Cyclodextrins in nanotechnology István Puskás
KÉM/299	6 credits, theory, optional, no repetition Computer-aided drug design György Keserű
KÉM/301	6 credits, theory, optional, no repetition Mass spectrometry of biomolecules Pál Szabó
KÉM/302	6 credits, theory, optional, no repetition Theory of measurement techniques of NMR spectroscopy János Rohonczy
KÉM/303	6 credits, theory, optional, no repetition NMR spectroscopy of solids and solutions János Rohonczy
KÉM/304	6 credits, theory, optional, no repetition Protein crystallography Veronika Harmat
KÉM/305	6 credits, theory, optional, no repetition Organosilicon chemistry Roland Szalay
KÉM/306	6 credits, theory, optional, no repetition Theoretical organic chemistry II János Daru
KÉM/311	6 credits, theory, optional, no repetition Theoretical background of experimental electrochemistry II Győző Láng
	6 credits, theory, optional, no repetition

KÉM/312	The Monte Carlo method Pál Jedlovsky 6 credits, theory, optional, no repetition
KÉM/313	Molecular recognition Péter Kele 6 credits, theory, optional, no repetition
KÉM/314	Carbohydrate chemistry Virág Zsoldosné Mády 6 credits, theory, optional, no repetition
KÉM/316	Nanoparticles and nanosystems Attila Bóta 6 credits, theory, optional, no repetition
KÉM/317	Biomolecular mass spectrometry Gitta Schlosser 6 credits, theory, optional, no repetition
KÉM/318	Optimization of drug substances György Tibor Balogh 6 credits, theory, optional, no repetition
KÉM/320	Analysis of protein drugs Zoltán Urbányi 6 credits, theory, optional, no repetition
KÉM/321	Electrochemical metal deposition László Péter 6 credits, theory, optional, no repetition
KÉM/324	Hyphenated techniques for elemental speciation Viktor Mihucz 6 credits, theory, optional, no repetition
KÉM/325	Theoretical methods to precision spectroscopy Edit Mátyus 6 credits, theory, optional, no repetition
KÉM/326	Selected topics from modern quantum mechanics for chemists Edit Mátyus 6 credits, theory, optional, no repetition
KÉM/327	Chemometrics Károly Héberger 6 credits, theory, optional, no repetition
KÉM/328	Modern methods of multivariate data analysis Károly Héberger 6 credits, theory, optional, no repetition
KÉM/329	Nonlinear dynamics: Self organization in chemical and biological systems István Szalai 6 credits, theory, optional, no repetition
KÉM/330	Scientific presentation Zsuzsanna Eke 6 credits, theory, optional, no repetition
KÉM/331	Digital simulation in electrochemistry Soma Vesztergom 6 credits, theory, optional, no repetition
KÉM/332	Marketing authorisation of pharmaceutical products Bulcsú Herényi & Herta Goóts Pálfi 6 credits, theory, optional, no repetition
KÉM/333	Proposal writing Ágnes Gulyás 6 credits, theory, optional, no repetition
KÉM/334	Drug discovery

KÉM/335	Kotschy András 6 credits, theory, optional, no repetition Research and development in the pharmaceutical industry
KÉM/336	Kotschy András 6 credits, theory, optional, no repetition Methods and ethics of scientific research and publication,
KÉM/337	Kiss Loránd 6 credits, theory, optional, no repetition Modern synthesis of representative pharmaceuticals - retrosynthesis,
KÉM/338	Kiss Loránd 6 credits, theory, optional, no repetition Supramolecular Chemistry
KÉM/339	László Petri 6 credits, theory, optional, no repetition Computation of thermodynamic and spectroscopic properties by path- integral molecular dynamics
KÉM/340	Ádám Madarász 6 credits, theory, optional, no repetition Trends in Chemistry I
KÉM/341	István Szalai 6 credits, theory, optional, no repetition Trends in Chemistry II
KÉM/342	András Perczel 6 credits, theory, optional, no repetition Trends in Chemistry III
	Dr. Ágnes Szabados 6 credits, theory, optional, no repetition
KÉM/CD1	Credit transfer
KÉM/TS1	6 credits, theory, optional, can be repeated Training School
KÉM/TS2	3 credits, theory, optional, can be repeated Training School
KÉM/LEC1	6 credits, theory, optional, can be repeated Lecture series in English
KÉM/LEC2	6 credits, theory, optional, can not be repeated Lecture Series in English
KÉM/LEC3	6 credits, theory, optional, can not be repeated Lecture Series in English
KÉM/LEC4	6 credits, theory, optional, can not be repeated Lecture Series in English
KÉM/LEC5	6 credits, theory, optional, can not be repeated Lecture Series in English
KÉM/LEC6	6 credits, theory, optional, can not be repeated Lecture Series in English
	6 credits, theory, optional, can not be repeated

EVALUATION AND CONTROL

Fulfilment of the requirements of a given course is evaluated and recorded in the transcript by the lecturer on a five-point scale (1-2-3-4-5, 1: failed 5: excellent).

Research activities are evaluated and recorded in the transcript by the supervisor on a three-point scale (excellent – acceptable - failed). Credits are approved by the program directors. Outstanding research achievements, proved by scientific publications, books or books chapters, can be honored by a maximum of 30 ECTS credits. A request for such credits should be submitted by the student and approved by the KDIT. Research achievements obtained prior to the start of the PhD School cannot be counted toward the degree. Exceptions can be granted by the KDIT.