I. PhD School of Chemistry

Discipline: science
Form of education: PhD training
Objectives of the Program: acquire the academic degree 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: 48-60, II: 0), research credit (I: 60, II: 120), and teaching credit (I: 0-12)
Person responsible for the training: Dr. Attila G. Császár, professor of chemistry, head of the PhD School

II. Faculty responsible for the training: Faculty of Science

III. PhD program:

Heads of the programs:
Synthetic, organic and biomolecular chemistry: Prof. Dr. András Perczel
Theoretical, physical, and structural chemistry: Prof. Dr. Péter Surján
Analytical chemistry, material science, electrochemistry, colloidal and environmental chemistry: Prof. Dr. Éva Kiss

Training modul (credits to be obtained: 48-60):

Compulsory courses for PhD students without an MSc degree in chemistry or chemical engineering:

Program on synthetic, organic and biomolecular chemistry
A) Organic chemistry, 12 credits
B) Biomolecular chemistry, 12 credits
C) Inorganic chemistry, 12 credits

Program on theoretical, physical, and structural chemistry
A) Theoretical chemistry, 12 credits
B) Physical chemistry, 12 credits
C) Structural chemistry, 12 credits

Program on analytical chemistry, material science, electrochemistry, colloidal, and environmental chemistry
A) Analytical chemistry, 12 credits
B) Colloidal chemistry, 12 credits
C) Electrochemistry, 12 credits
D) Environmental chemistry, 12 credits
E) Material science, 12 credits

Students must take exams of at least two compulsory courses. It is allowed to take courses from another program than the student is assigned to.

Optional courses (all are classroom courses for 6 credits, cannot be repeated)

KÉM/1 Computational statistical mechanics
KÉM/6 Ring transformations in heterocyclic chemistry
KÉM/7 Quantum chemistry and structure determinations
KÉM/8 Quantum mechanics of molecular motions
KÉM/9 Stability of colloidal drug delivery systems
KÉM/10 Interfacial behavior of macromolecules
KÉM/11 Electromigration techniques
KÉM/12 Molecular modeling via quantum chemistry
KÉM/13 Liquid crystals
KÉM/14 Computational chemistry
KÉM/15 Electrostatic interactions in colloid systems
KÉM/16 Self-association of surfactants in solution
KÉM/18 Heteroaromatic chemistry
KÉM/19 Biomolecular chemistry
KÉM/20 Stereochemistry and chiroptical spectroscopy
KÉM/21 Green chemistry
KÉM/22 The chemistry of cyclodextrins
KÉM/23 Bioconjugates
KÉM/24 Selected chapters of peptide and protein chemistry
KÉM/25 History of electrochemistry
KÉM/26 Theoretical electrochemistry
KÉM/27 Basics of macromolecular technology
KÉM/28 Principles of molecular engineering of macromolecules
KÉM/29 Advanced organic chemistry
KÉM/30 Chromatographic separation of enantiomers
KÉM/31 New trends in X-ray crystallography
KÉM/32 Basic neurochemistry
KÉM/33 Methods of applied statistics
KÉM/34 Modern reaction kinetics
KÉM/35 Surface chemistry of biomaterials
KÉM/36 Solid/liquid interfacial phenomena – nanolayers
KÉM/37 Electrochemistry and corrosion of metals - an advanced course
KÉM/39 Applied catalysis
KÉM/40 Modern synthetic methods
KÉM/41 Theoretical background of experimental electrochemistry
KÉM/42 Theory of the kinetics of elementary reactions
KÉM/43 Selected lectures in quantum chemistry
KÉM/44 Advanced bioorganic chemistry
KÉM/45 Advanced bioorganic chemistry
KÉM/46 Shape, similarity and complementarity of molecules
KÉM/47 Preparation of cyclo- and oligopeptides
KÉM/48 Colloidal chemistry of network structures
KÉM/49 Molecular modelling
KÉM/50 Oscillation and other dynamic phenomena in chemistry
KÉM/51 Structure elucidation of peptides and proteins by NMR
KÉM/52 Bio-NMR pulse-sequences
KÉM/53 GC and HPLC in the analysis of organic compounds
KÉM/54 Methods of quantum chemistry
KÉM/55 Modern methods of quantum chemistry
KÉM/56 Disorder in condensed phases
KÉM/57 Organofluorine chemistry
KÉM/58 Methods of surface examination
KÉM/59 NMR spectroscopy of solids and solutions

KÉM/60 Physical organic chemistry
KÉM/61 Instrumental nuclear methods applied in environmental analysis
KÉM/62 Selected lectures in physical chemistry
KÉM/63 Reactivity of metal complexes in solution, homogeneous catalysis
KÉM/64 Homogeneous catalysis
KÉM/65 Theoretical study of biopolymers
KÉM/66 Applied NMR spectroscopy
KÉM/67 Applied NMR spectroscopy
KÉM/68 Mathematical methods in quantum chemistry I
KÉM/69 Mathematical methods in quantum chemistry II
KÉM/70 Peptidomimetics
KÉM/71 Kinetics of electrode reactions
KÉM/72 Modern methods of quantum chemistry
KÉM/73 Spectroscopic application of molecular dynamics
KÉM/74 Application of photoionization spectroscopy
KÉM/75 Organometallic chemistry II
KÉM/76 Methods in multicomponent xtatistics
KÉM/77 Investigation of metal corrosion by electrochemical methods
KÉM/78 Asymmetric synthesis
KÉM/79 Applied gas chromatography
KÉM/80 Separation techniques in organic chemistry
KÉM/81 Environmental and health effects of energy production
KÉM/82 Combustion chemistry and physics
KÉM/83 Investigation of reaction mechanisms
KÉM/84 Applied computer simulations
KÉM/85 Elementary reaction dynamics
KÉM/86 Mass spectrometry II
KÉM/87 Nuclear techniques in material science
KÉM/88 Analytical application of plasma spectroscopy
KÉM/89 Environmental analysis
KÉM/90 Enrichment methods in atomic spectroscopy
KÉM/91 Density functional methods for the description of electronic structures
KÉM/92 Vacuum techniques
KÉM/93 Basic and applied quantum chemistry
KÉM/94 Proteome analysis and protein structure
KÉM/95 Applied electrochemistry
KÉM/96 Photophysics and photochemical kinetics
KÉM/97 Multivariate statistical methods II
KÉM/98 Cyclodextrins in nanotechnology
KÉM/99 Computer-aided drug design
KÉM/100 Lecture series in English (courses of visiting professors)
KÉM/101 Mass spectrometry of biomolecules
KÉM/102 Theory of NMR techniques
KÉM/103 NMR spectroscopy of solids
KÉM/104 Protein crystallography
KÉM/105 Organosilicon chemistry
KÉM/106 Theoretical organic chemistry II
KÉM/107 Advances in organic and biomolecular chemistry
KÉM/108 Chemistry of protein biosynthesis
KÉM/109 Thermal decomposition of organic macromolecules
KÉM/110 Stochastic processes in physical chemistry
KÉM/111 Theoretical background of experimental electrochemistry II
KÉM/112 The Monte Carlo method
KÉM/113 Molecular recognition
KÉM/115 Theory and evaluation of NMR measurements

KÉM/116 Structural studies of nanoparticles and nanosystems
KÉM/117 Mass spectrometry of biomolecular systems
KÉM/118 Optimal parameters of active agents of medicines
KÉM/119 Selected topics of classical physical chemistry
KÉM/120 Analytics of protein active medicinal agents
KÉM/121 Electrochemical metal deposition
KÉM/122 Nuclear techniques of structure determination
KÉM/124 Coupled measurement techniques for determining chemical forms of elements
KÉM/ÁH-KV ECTS credit transfer

Research modul (ECTS credits to be acquired: 120):
KÉM/KUT Guided research work (credits to be acquired: I: 60, II: 120; in each semester I: 15, II: 30)
compulsory, cannot be repeated

Course modul (credits to be acquired: I: 0-12)
At least two hours per week, seminar, laboratory practice, or lecturing
optional, can be repeated four times

List of complex examination topics (all are optional)
1. Organic chemistry
2. Inorganic chemistry
3. Analytical chemistry
4. Physical chemistry
5. Methods of structure analysis
6. Theoretical chemistry
7. Electrochemistry
8. Colloidal chemistry
9. Nuclear chemistry
10. Polimer chemistry
11. Environmental chemistry

IV. 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.