Study plan

Name of study plan: Jaderná chemie

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Nuclear Chemistry Type of study: Follow-up master full-time

Required credits: 2

Elective courses credits: 118 Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 0

The role of the block: P

Code of the group: NMSPJCH1

Name of the group: MDP P_JCHN 1st year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 16 courses

Credits in the group: 0

Student absolvuje aspoň 1 blok povinně volitelných předmětů. Vstup do praktika 15SEPM je Note on the group:

podmíněn absolvováním, nebo současným zápisem předmětu 15SMJ1. Vstup do praktika 15PRACH

| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
|---------|---|------------|---------|-------|----------|------|
| 15RAEK | Helena Filipská Helena Filipská Helena Filipská (Gar.) | ZK | 2 | 2+0 | Z | Р |
| 15EXK2 | Excursion 2 Alena Zavadilová, Barbora Drtinová Alena Zavadilová Alena Zavadilová (Gar.) | Z | 1 | 5 dn | L | Р |
| 15FCHN3 | Physical Chemistry 3 Václav uba Václav uba Václav uba (Gar.) | Z,ZK | 2 | 1+1 | Z | Р |
| 15FCHA4 | Physical Chemistry 4 Viliam Mú ka, Lenka Prouzová Procházková Lenka Prouzová Procházková Viliam Mú ka (Gar.) | Z,ZK | 4 | 2P+2C | L | Р |
| 15PJCH | Practical Exercises in Nuclear Chemistry Kate ina ubová, Miroslava Semelová, Pavel Bartl Miroslava Semelová Kate ina ubová (Gar.) | KZ | 4 | 0+4 | Z | Р |
| 15PRACH | Practical Exercises in Radiation Chemistry Lenka Prouzová Procházková, Jan Bárta Lenka Prouzová Procházková Jan Bárta (Gar.) | KZ | 3 | 0+3 | L | Р |
| 15SEPM | Practical Exercises in Separation Methods Miroslava Semelová, Pavel Bartl, Mojmír N mec Miroslava Semelová Mojmír N mec (Gar.) | KZ | 3 | 0+3 | Z | Р |
| 15PRAKN | Internship Václav uba Václav uba Václav uba (Gar.) | Z | 4 | 2 týd | L | Р |
| 15RACH | Radiation Chemistry Václav uba Václav uba Václav uba (Gar.) | ZK | 4 | 3+0 | L | Р |
| 15RMBM | Radiation Methods in Biology and Medicine Václav uba Václav uba (Gar.) | ZK | 2 | 2+0 | L | Р |
| 15RAM | Radioanalytical Methods Jan John Jan John Jan John (Gar.) | ZK | 3 | 3+0 | L | Р |
| 15STP | Trace Radiochemistry Helena Filipská Helena Filipská (Gar.) | ZK | 3 | 3+0 | L | Р |
| 15SMJ1 | Separation Methods in Nuclear Chemistry 1 Mojmír N mec Mojmír N mec Mojmír N mec (Gar.) | ZK | 3 | 3+0 | Z | Р |
| 15TLA | Solids Viliam Mú ka, Jan Bárta Jan Bárta Viliam Mú ka (Gar.) | ZK | 1 | 1P | L | Р |

| 5VUCH1 | Research Project 1 Lenka Prouzová Procházková, Kate ina ubová, Miroslava Semelová, Pavel Bartl, Mojmír N mec, Jan John, Petr Distler Lenka Prouzová Procházková Lenka Prouzová Procházková (Gar.) | Z | 6 | 0+6 | Z | Р |
|--|--|---|--|--|--|--|
| 5VUCH2 | Research Project 2 Lenka Prouzová Procházková Lenka Prouzová Procházková (Gar.) | KZ | 8 | 0+8 | L | Р |
| haracteristics of th | he courses of this group of Study Plan: Code=NMSPJCH1 Name | ■MDP P_JCH | IN 1st ye | ar | | |
| 5RAEK | | | | _ | ZK | 2 |
| • | deals with general problems of the environment. Then composition of and natural process | | | _ | - | |
| | radioactivity are discussed in detail. The last part describes sources of environmental po | llution, migration, | chemical re | eactions and | d effects of | pollutants in t |
| · · | analysis of basic problems of radioecology. | | | | | |
| - | excursion 2 | | | | Z | 1 |
| | diating the students the acquaintance with various radiochemical and radiation methods | used in practice. | | | 7.714 | |
| | Physical Chemistry 3 | | 0 | 1 | Z,ZK | 2 |
| | urse, a general description and explanation of laws affecting behaviour of the particle sys le study on the matter in motion, based on its inner structure, properties of structural elem | • | | | - | |
| | is and fundamental calculations. | ienis, mutuai inte | ractions and | i lorce neius | s. The cour | se also conta |
| | Physical Chemistry 4 | | | 7 | Z,ZK | 4 |
| ı | cal chemistry 4 devoted to reaction kinetics, the course is focused on the reaction rate, isola | ted reactions of v | arious order | | , I | • |
| | dependence of the rate constants. Hard-sphere collision theory, activated-complex theory | | | | | |
| · · | ee radicals and reactions in liquid solutions are discussed, too. These subjects are trained | • | | | | |
| 5PJCH F | Practical Exercises in Nuclear Chemistry | - | | | KZ | 4 |
| | lents practical introduction to fundamental priciples of nuclear processes such as radionu | clide decay, prep | aration of ra | ndionuclides | with therm | nal neutron |
| tivation and utilization of | f radioactive equlibrium e.g. in radionuclide generators. The nuclear chemistry / radiocher | mistry processes | such as Szi | lard-Chalme | ers effects, | and principle |
| coprecipitation are dem | onstrated, too. | | | | | |
| 5PRACH F | Practical Exercises in Radiation Chemistry | | | | KZ | 3 |
| this practical exercises, | the students will familiarize themselves with the principles of experimental radiation chem | nistry and photod | hemistry ar | ıd obtain kno | owledge in | the practical |
| • | nd photochemical methods for characterization of irradiation sources (chemical dosimetry | | | • | | |
| | of photon flow in non-ionizing radiation sources), syntheses of various inorganic materials | (metals, simple o | xides, indire | ct synthesis | of multicor | mponent oxid |
| · · · · · · · · · · · · · · · · · · · | photochemical reactions. | | | | | |
| | Practical Exercises in Separation Methods | | | | KZ | 3 |
| | onsists of set of practical tasks aiming to show fundamental radiochemical separation me | | | | | |
| | e received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry | | | uired in prev | ious labora | atory exercise |
| | | | | | | |
| • | tion, chromatographic, coprecipitation procedures and principles, in which good work ma | nagement and pr | oper handli | ng with oper | n radioactiv | e sources ar |
| uclear waste is necessar | y. Various types of radionuclides, single or in genetic relationship are used. | nagement and pr | oper handli | ng with oper | | |
| uclear waste is necessar 5PRAKN | y. Various types of radionuclides, single or in genetic relationship are used. nternship | nagement and pr | oper handli | ng with oper | n radioactiv | e sources ar |
| uclear waste is necessar 5PRAKN II The internship aims at pro | y. Various types of radionuclides, single or in genetic relationship are used. nternship oviding the student with practical experience. | nagement and pr | oper handli | | Z | 4 |
| uclear waste is necessar 5PRAKN III 'he internship aims at pro 5RACH F | y. Various types of radionuclides, single or in genetic relationship are used. Internship oviding the student with practical experience. Radiation Chemistry | | | | Z ZK | 4 |
| uclear waste is necessar 5PRAKN III he internship aims at pro 5RACH F art one of this course dea | y. Various types of radionuclides, single or in genetic relationship are used. Internship oviding the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of Radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of Radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of Radiolysis (PIP) caused by the student with the formation of Primary Intermediate Products of Radiolysis (PIP) caused by the student with the PIP caused by the student with the student w | absorption of ioni | zing radiatio | on in matters | Z ZK s. General o | 4 overview of the |
| uclear waste is necessar 5PRAKN III he internship aims at pro 5RACH F art one of this course dearoperties and reactions le | y. Various types of radionuclides, single or in genetic relationship are used. Internship Internship Inviding the student with practical experience. Radiation Chemistry Internediate Products of radiolysis (PIP) caused by the reading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well | absorption of ioni | zing radiatio | on in matters | Z ZK s. General o | 4 overview of the |
| puclear waste is necessar 5PRAKN III the internship aims at pro 5RACH F art one of this course decroperties and reactions is didiolysis of selected mate | y. Various types of radionuclides, single or in genetic relationship are used. Internship Internship | absorption of ioni | zing radiatio | on in matters | ZK s. General of mistry) is d | 4 overview of the |
| suclear waste is necessar 5PRAKN III he internship aims at pro 5RACH Fart one of this course dear roperties and reactions leadiolysis of selected mate 5RMBM F | y. Various types of radionuclides, single or in genetic relationship are used. Internship Internship | absorption of ioni I. The part two (s | zing radiatic | on in matters | ZK S. General of mistry) is do | 4 overview of the dicated to the di |
| suclear waste is necessar 5PRAKN III he internship aims at pro 5RACH F art one of this course dear roperties and reactions leadiolysis of selected mate 5RMBM F of the first part, the sources | ry. Various types of radionuclides, single or in genetic relationship are used. Internship oviding the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the reading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine so finizing radiation (IR) used in biology and medicine are thoroughly discussed. Description | absorption of ioni I. The part two (s tion of interaction | zing radiatic ystematic ra | on in matters idiation cher | ZK s. General of mistry) is defined a fidence of identification. | 4 verview of the dicated to the dic |
| suclear waste is necessar 5PRAKN III he internship aims at pro 5RACH F art one of this course dear roperties and reactions leadiolysis of selected mate 5RMBM F of the first part, the sources in biologically important s | y. Various types of radionuclides, single or in genetic relationship are used. Internship Internship | absorption of ioni I. The part two (s tion of interaction | zing radiatic ystematic ra | on in matters idiation cher | ZK s. General of mistry) is defined a fidence of identification. | 4 verview of the dicated to the dic |
| Declear waste is necessar 5PRAKN III The internship aims at processor 5RACH For art one of this course dear roperties and reactions leadiolysis of selected mater 5RMBM For the first part, the sources in biologically important seleguard and dozimetry. | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the seading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radional results. | absorption of ioni I. The part two (s tion of interaction | zing radiatic ystematic ra | on in matters idiation cher latter and info | ZK s. General of mistry) is discounting ZK ZK fluence of idadiotherape | 4 4 overview of the edicated to the discontinuity of the edicated to the edicated to the edicated to the edicated the edi |
| colear waste is necessar 5PRAKN III The internship aims at processor 5RACH For and reactions to diolysis of selected materials for the first part, the sources in biologically important is afeguard and dozimetry. | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the a eading to the formation of Stable Products of Radiolysis (SPR) is given in this part as wel erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radio- | absorption of ioni I. The part two (s tion of interaction obiological actior | zing radiatio ystematic ra of IR with m | on in matters idiation cher atter and inf | ZK s. General comistry) is diverse of icadiotherape | 4 4 overview of the edicated to the edicated restricts and the edicated methods. |
| suclear waste is necessar 5PRAKN III he internship aims at pro 5RACH Fart one of this course dear roperties and reactions leadiolysis of selected mate 5RMBM Farthe first part, the source in biologically important is afeguard and dozimetry. 5RAM Farthe source gives a detaile | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the reading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radionallytical Methods are overview of all main radioanalytical methods, specifically: Indicator methods, analysis by | absorption of ioni I. The part two (s tion of interaction obiological action | zing radiation izing radiation radiodiagram, | on in matters adiation cher atter and infostic and ra | ZK s. General comistry) is discounted by the second | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated methon and the edical methon and the edicated method an |
| colear waste is necessar 5PRAKN III The internship aims at processor 5RACH For and reactions to diolysis of selected mater 5RMBM For the first part, the source in biologically important series and dozimetry. 5RAM For a course gives a detaile nalysis (IDA), substoichic | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the a eading to the formation of Stable Products of Radiolysis (SPR) is given in this part as wel erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radio- | absorption of ioni I. The part two (solution of interaction obiological action of means of natural control of the control of | zing radiation ystematic radiodiagram, radiodiagram, irradiation | on in matters diation cher atter and inf nostic and ra | ZK s. General comistry) is diverse of icadiotherape ZK e elements, I neutrons, | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method as a southeast of the edicated method method as a southeast of the edicated method as a southeast of the edicated method method as a southeast of the edicated method me |
| puclear waste is necessar 5PRAKN III the internship aims at pro 5RACH Fart one of this course dear coperties and reactions leadiolysis of selected mate 5RMBM Farthe first part, the source in biologically important is afeguard and dozimetry. 5RAM Farthe course gives a detaile malysis (IDA), substoichic ist and resonance neutro | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the reading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radionallytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by ometric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, acons, irradiation with charged particles and gamma-rays, non-activation interaction analysis | absorption of ioni I. The part two (solution of interaction obiological action of means of natural control of the control of | zing radiation ystematic radiodiagram, radiodiagram, irradiation | on in matters addition cher atter and infostic and rage gradioactive with thermals, PIXE, RB | ZK s. General comistry) is distry) is distryone of icadiotheraped ZK e elements, I neutrons, S. | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated methon and the edical methon and the edicated method an |
| Iclear waste is necessar 5PRAKN II In the internship aims at properties. 5RACH FAIT OF THE PROPERTIES AND FAIT OF THE PROPERTI | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the a eading to the formation of Stable Products of Radiolysis (SPR) is given in this part as wel erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radi Radioanalytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by metric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, ac | absorption of ioni I. The part two (si tion of interaction obiological action of means of natura ctivation analysis, s, X-ray fluoresce | izing radiation ystematic radiotic radiodiagram, radiodiagram, irradiation ince analysi | on in matters idiation cher in atter and informatic and range gradioactive with therma s, PIXE, RB | ZK s. General comistry) is described by the selements, I neutrons, S. ZK | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method as a solution with the edicated me |
| Iclear waste is necessar 5PRAKN III ne internship aims at pro 5RACH FACH FACH III ne art one of this course deal coperties and reactions led diolysis of selected mate 5RMBM FACH FACH FACH FACH FACH FACH FACH FACH | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the reading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine sof ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radionallytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by metric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, are ins, irradiation with charged particles and gamma-rays, non-activation interaction analysis frace Radiochemistry | absorption of ioni I. The part two (si tion of interaction obiological action of means of natura ctivation analysis, s, X-ray fluoresce r, especially radio | izing radiation ystematic radiotic radiodiagrally occurring, irradiation nuclides, in I | on in matters addiation cher atter and infostic and rag radioactive with therma s, PIXE, RB | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micro | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method as a solution with the edicated to the edicated method as a solution with the edicated method method as a solution with the edicated method as a solutio |
| colear waste is necessar 5PRAKN III The internship aims at properties and reactions leadingly in biologically important is affeguard and dozimetry. 5RAM Fine course gives a detaile nalysis (IDA), substoichic at and resonance neutrons are course deals with the systems and with methods. | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the reading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine sof ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radionallytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by ometric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, at ons, irradiation with charged particles and gamma-rays, non-activation interaction analysis frace Radiochemistry state (speciation) and physicochemical behaviour of very low concentrations (traces) of matter | absorption of ioni I. The part two (si tion of interaction obiological action of means of natura ctivation analysis, s, X-ray fluoresce r, especially radio us of radionuclide | izing radiation ystematic radiodiagram, radiodiagram, irradiation ince analysis and of me | on in matters addiation cher and infostic and rate gradioactive with therma s, PIXE, RB nomogeneou thods of word | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micrork with solu | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method as a solution with the edicated to |
| sclear waste is necessar 5PRAKN III the internship aims at pro 5RACH FOR STACH III TO STACH III | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the a eading to the formation of Stable Products of Radiolysis (SPR) is given in this part as wel erial systems. Radiation Methods in Biology and Medicine as of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript activatures and organisms follows. The last part of the course is dedicated to theory of radio- Radioanalytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by metric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, an ons, irradiation with charged particles and gamma-rays, non-activation interaction analysis frace Radiochemistry state (speciation) and physicochemical behaviour of very low concentrations (traces) of matte as of their study. It presents detailed discussion of formation and properties of colloidal form | absorption of ioni I. The part two (si tion of interaction obiological action of means of natura ctivation analysis, s, X-ray fluoresce r, especially radio us of radionuclide | izing radiation ystematic radiodiagram, radiodiagram, irradiation ince analysis and of me | on in matters addiation cher and infostic and rate gradioactive with therma s, PIXE, RB nomogeneou thods of word | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micrork with solu | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method as a solution with the edicated to |
| suclear waste is necessar 5PRAKN III the internship aims at pro 5RACH Fart one of this course dear roperties and reactions leadiolysis of selected materials and interest and resources in biologically important is affeguard and dozimetry. 5RAM Farther course gives a detaile malysis (IDA), substoichic list and resonance neutro 5STP The course deals with the saystems and with methods acces to be studied. The coarses. | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the a eading to the formation of Stable Products of Radiolysis (SPR) is given in this part as wel erial systems. Radiation Methods in Biology and Medicine as of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript activatures and organisms follows. The last part of the course is dedicated to theory of radio- Radioanalytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by metric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, an ons, irradiation with charged particles and gamma-rays, non-activation interaction analysis frace Radiochemistry state (speciation) and physicochemical behaviour of very low concentrations (traces) of matte as of their study. It presents detailed discussion of formation and properties of colloidal form | absorption of ioni I. The part two (si tion of interaction obiological action of means of natura ctivation analysis, s, X-ray fluoresce r, especially radio us of radionuclide | izing radiation ystematic radiodiagram, radiodiagram, irradiation ince analysis and of me | pon in matters indication cherical atter and information and rate gradioactive with therma s, PIXE, RB incomogeneous thods of world adsorption a | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micrork with solu | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated methon as a solution of the edicated methon with edicated methon with edicated methon edicated methods as a solution of the edicated method methods as a solution of the edicated method methods as a solution of the edicated methods as a solution of the edicated method method methods as a solution of the edicated method method methods as a solution of the edicated method methods as a solution of the edicated method methods as a solution of the edicated method method method method method methods as a solution of the edicated method methods as a solution of the edicated method methods as a solution of the edicated method method method method methods as a solution of the edicated method met |
| Inclear waste is necessar Inclear waste is necessar Inclear the internship aims at properties. Inclear the first part, the sources of the first part, th | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the acading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine as of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radio-radio | absorption of ioni I. The part two (si ition of interaction obiological action or means of natura ctivation analysis, s, X-ray fluoresce r, especially radio as of radionuclide ticularly the copr | of IR with many ally occurring irradiation and of me ecipitation, | pon in matters idiation cher in atter and information and rate gradioactive with thermal s, PIXE, RB incomogeneous thods of world adsorption a | ZK s. General comistry) is do ZK fluence of iconditional control control ZK e elements, I neutrons, S. ZK us and micror k with solutional electron ZK | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method as a solution of the edicated to the edicated method as a solution of the edicated to the edicated method as a solution of the edicated method as a sol |
| aclear waste is necessar 5PRAKN III ne internship aims at pro 5RACH FART III art one of this course deal operties and reactions led diolysis of selected materials. The first part, the sources of body in the first part, the sources of selected materials. The first part, the sources of selected materials is affeguard and dozimetry. 5RAM FAM FAME III are course gives a detailed nalysis (IDA), substoiching at and resonance neutro of stand resonance neutrons of selections and with methods access to be studied. The course of selections is lecture consists of senapter gives a general over the selections. | nternship oviding the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the abeading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine as of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radio-r | absorption of ioni I. The part two (si I. The | of IR with many occurring irradiation nuclides, in I s and of me ecipitation, extraction occurrences, extraction occurrences. | pon in matters addiation cher and informatter | ZK s. General comistry) is do ZK fluence of icadiotherape ZK e elements, I neutrons, S. ZK us and micrork with solution delectron ZK citation calculation calculat | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method as a solution of the |
| Iclear waste is necessar 5PRAKN II The internship aims at properties and reactions led 5RACH FART II TO THE TO | Internship | absorption of ioni I. The part two (si I. The | of IR with many and the control of IR with many ally occurring irradiation nuclides, in I is and of me ecipitation, seed followers, extraction of g theoretical | g radioactive with therma s, PIXE, RB nomogeneouthods of word adsorption a ed with spec of chelates, of a spects of | ZK s. General comistry) is do ZK fluence of icadiotherape ZK e elements, I neutrons, S. ZK us and micrork with solution delectrod ZK citation calculation calculat | 4 4 overview of the edicated to the edicated |
| Iclear waste is necessar 5PRAKN II The internship aims at properties and reactions led GRACH FARTH | Internship | absorption of ioni I. The part two (si I. The | of IR with many and the control of IR with many ally occurring irradiation nuclides, in I is and of me ecipitation, seed followers, extraction of g theoretical | g radioactive with therma s, PIXE, RB nomogeneouthods of word adsorption a ed with spec of chelates, of d specific re | ZK s. General comistry) is do ZK fluence of icadiotherape ZK e elements, I neutrons, S. ZK us and micrork with solution delectron ZK citation calculation calculat | 4 4 overview of the edicated to the edicated method and edicated method and edicated method and edicated method and edicated method edicated edicated method edicated e |
| clear waste is necessar FRAKN II the internship aims at processor FRACH For the order of this course deader of this course deader of the first part, the sourcest part part part part part part part par | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the steading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descrip structures and organisms follows. The last part of the course is dedicated to theory of radionalytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by sometric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, acons, irradiation with charged particles and gamma-rays, non-activation interaction analysis for the radio particles and gamma-rays, non-activation interaction analysis for the lecture is also the distribution of traces in macroheterogeneous systems, particles of the lecture is also the distribution of traces in macroheterogeneous systems, particles of the separation methods in Nuclear Chemistry 1 Inversal chapters, at the beginning the chemistry of complex compounds, its generation and erview of the separation methods and their comparison. Further, the fundamentals of liquic gether with ion-exchange chromatography, and other chromatographic methods are discumples. The whole lecture is oriented to utilization of these methods in nuclear and radioch Solids | absorption of ioni I. The part two (si I. The | of IR with many radiation and ally occurring irradiation and and of meeting irradiation, and of meeting irradiation, and of meeting irradiation, and of meeting irradiation, assed followers, extraction of g theoretical antages and anta | g radioactive with therma s, PIXE, RB nomogeneou thods of wor adsorption a ded with speces of chelates, all aspects of d specific re | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micror with solution calculation c | 4 4 2 2 2 2 2 2 2 2 2 3 3 4 3 4 4 2 4 4 4 4 4 4 4 4 4 4 |
| clear waste is necessar FRAKN III the internship aims at pro FRACH For the of this course deal properties and reactions led click of selected mater FRMBM For the first part, the sources biologically important is feguard and dozimetry. FRAM For the course gives a detaile the lalysis (IDA), substoichic that and resonance neutro FRAM To the course deals with the is the stand resonance neutro FRAM To the course deals with the second to be studied. The course to be studied. The course to be studied. The course deals with the second to be studied. The course to be studied. The course to be studied to the course deals with the second to be studied. The course to be studied to the course to be studied. The course to be studied to the course focus a general owe course focus a general owe course focus on be course focus on the course f | Internship | absorption of ioni I. The part two (si I. The | of IR with many ally occurring irradiation and of meeting irradiation, seed followers, extraction of the grantages and the materials through the second in the second irradiation, and the second irradiation is seed followers. | g radioactive with therma s, PIXE, RB nomogeneou thods of wor adsorption a ded with specific relates, it aspects of d specific relates, ough the app | ZK s. General of mistry) is do ZK fluence of ideadiotherape ZK e elements, I neutrons, S. ZK us and micrork with solution calculation calculation calculation calculation calculation calculation of the methological calculat | 4 4 overview of the edicated to the edicated method of the edicated met |
| clear waste is necessar 5PRAKN III ne internship aims at pro 5RACH FART III art one of this course dea coperties and reactions le diolysis of selected mate 5RMBM FART III the first part, the sources of biologically important s of seguard and dozimetry. 5RAM FART III TO BE COURSE GIVES A detaile nalysis (IDA), substoichic set and resonance neutro of STP TART III TO BE COURSE deals with the s restems and with methods acces to be studied. The course of seguard and practical examples of seguard over cory of ion exchange tog gents, and practical examples of the course focuses on be act of the course involves art of the course involves art of the course involves | nternship right with the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the reading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine s of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Description in the course is dedicated to theory of radionallytical Methods and overview of all main radioanalytical methods, specifically: Indicator methods, analysis by cometric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, are state (speciation) and physicochemical behaviour of very low concentrations (traces) of matters of their study. It presents detailed discussion of formation and properties of colloidal form obeject of the lecture is also the distribution of traces in macroheterogeneous systems, particely and their comparison. Further, the fundamentals of liquic gether with ion-exchange chromatography, and other chromatographic methods are discumples. The whole lecture is oriented to utilization of these methods in nuclear and radioch solids sic properties of solid materials resulting from their crystalline structure and on characters introduction to crystallography, chemical bonds in solids, crystal structure and its description introduction to crystallography, chemical bonds in solids, crystal structure and its description. | absorption of ioni I. The part two (si I. The | of IR with many and the control of the control of IR with many and the control of IR with many | g radioactive with therma s, PIXE, RB nomogeneou thods of wor adsorption a ded with specific relates, it aspects of d specific relates, ough the applied operations | ZK s. General comistry) is do ZK fluence of ice adiotherape ZK e elements, I neutrons, S. ZK us and micrork with solution calculation calculation calculation calculation calculation calculation calculation calculation calculation of s, and cryst | 4 4 overview of the edicated to the edicated method of the edicated met |
| suclear waste is necessar 5PRAKN III the internship aims at pro 5RACH FACH INTERPOLITION INTERPOLIT | Internship | absorption of ioni I. The part two (si I. The | of IR with many and part, the sand p | g radioactive with therma s, PIXE, RB nomogeneou thods of wor adsorption a ded with specific relates, it aspects of d specific relates, ough the applications or yof X-ray | ZK s. General comistry) is do ZK fluence of ice adiotherape ZK e elements, I neutrons, S. ZK us and micrork with solution calculation calc | 4 4 overview of the edicated to the edicated method of the edicated met |
| scale ar waste is necessar 5PRAKN In the internship aims at profits and reactions leadingly in the first part, the source of the course deals with the source of the so | Internship | absorption of ioni I. The part two (si I. The | of IR with many and part, the stal method | g radioactive with therma s, PIXE, RB nomogeneous thods of woradsorption a ded with spec of chelates, old aspects of d specific repugh the app d operations ory of X-ray and powder | ZK s. General comistry) is described by the selements, and micrors, s. ZK us and cryst diffraction of s, and cryst diffraction r diffraction | 4 4 overview of the edicated to the edicated method of the edicated method of the edicated method of the edicated method of the edicated of |
| suclear waste is necessar 5PRAKN III the internship aims at pro 5RACH For art one of this course dear froperties and reactions leadiolysis of selected mater 5RMBM For a the first part, the sources a detailed and selected and the selected mater and the selected mater and the first part, the sources are also considered and dozimetry. 5RAM For a the course gives a detailed analysis (IDA), substoiching a the course deals with the selected and the | Internship | absorption of ioni I. The part two (si I. The | of IR with man, radiodiagnally occurring, irradiation nuclides, in I s and of me ecipitation, extraction of g theoretical antages and part, the stall methodion, quantita | g radioactive with therma s, PIXE, RB nomogeneous thods of woradsorption a ded with spec of chelates, old aspects of d specific repugh the app d operations ory of X-ray and powder ative analysis | ZK s. General comistry) is described by the selements, and electron control of the methodour con | 4 4 overview of the edicated to the edicated method of the edicated method of the edicated method of the edicated method of the edicated of |
| suclear waste is necessar 5PRAKN III he internship aims at pro 5RACH FOR TOWN III he internship aims at pro 5RACH FOR TOWN III he internship aims at pro 5RACH FOR TOWN III he internship aims at pro 5RAM FOR TOWN III he course gives a detaile malysis (IDA), substoichid last and resonance neutro 5STP TOWN III he course deals with the systems and with methods aces to be studied. The coaces. 5SMJ1 STAM STAM his lecture consists of semapter gives a general owner of ion exchange toggents, and practical examples of the course focuses on beart of the course involves swell as the description icl. Braggs law of diffractification characters, and hysico-chemical properties. | Internship | absorption of ioni I. The part two (si I. The | of IR with man, radiodiagnally occurring, irradiation nuclides, in I s and of me ecipitation, extraction of g theoretical antages and part, the stall methodion, quantita | g radioactive with therma s, PIXE, RB nomogeneous thods of woradsorption a ded with spec of chelates, old aspects of d specific repugh the app d operations ory of X-ray and powder ative analysis | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micror with solution calculation calculation calculation calculation of selection of selection of selection of computation of selection of selection. | 4 4 2 2 2 2 2 2 2 3 3 4 3 4 2 4 4 4 4 4 4 4 4 4 4 4 |
| suclear waste is necessar 5PRAKN III The internship aims at pro 5RACH Fart one of this course dear roperties and reactions leadiolysis of selected mate 5RMBM Farther first part, the sources 10 biologically important selegard and dozimetry. 5RAM Farther first part, the sources 11 biologically important selegard and dozimetry. 12 Farther first part, the sources 13 fee course gives a detaile enalysis (IDA), substoiching attended and selegard and resonance neutro 14 fee course deals with the selegard and with methods acces to be studied. The course to be studied. The course selegard owner gives a general owner gents, and practical examples of the course focuses on be art of the course focuses on be art of the course involves selegard and hysico-chemical propertication. | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the seading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine so foinizing radiation (IR) used in biology and medicine are thoroughly discussed. Description in the part and organisms follows. The last part of the course is dedicated to theory of radioverview of all main radioanalytical methods, specifically: Indicator methods, analysis by pretric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, as ons, irradiation with charged particles and gamma-rays, non-activation interaction analysis of their study. It presents detailed discussion of formation and properties of colloidal form object of the lecture is also the distribution of traces in macroheterogeneous systems, par department of the separation methods in Nuclear Chemistry 1 veral chapters, at the beginning the chemistry of complex compounds, its generation and erview of the separation methods and their comparison. Further, the fundamentals of liquic gether with ion-exchange chromatography, and other chromatographic methods are discusples. The whole lecture is oriented to utilization of these methods in nuclear and radioch socials. The whole lecture is oriented to utilization of these methods for their detection, X-ray types based on their production mechanism, and methods for their detection, X-ray diffraction instrumentation, various measurements methods such as Laues methods using diffraction methods, measurements under non-standard conditions and also the Research Project 1 | absorption of ioni I. The part two (si I. The | of IR with man, radiodiagnally occurring, irradiation nuclides, in I s and of me ecipitation, extraction of g theoretical antages and part, the stall methodion, quantita | g radioactive with therma s, PIXE, RB nomogeneous thods of woradsorption a ded with spec of chelates, old aspects of d specific repugh the app d operations ory of X-ray and powder ative analysis | ZK s. General comistry) is described by the selements, and electron control of the methodour con | 4 4 2 2 2 2 2 2 2 3 3 4 3 4 2 3 4 3 4 4 4 4 4 4 4 4 4 4 |
| suclear waste is necessar 5PRAKN III he internship aims at pro 5RACH FOR TOWN III he internship aims at pro 5RACH FOR TOWN III he internship aims at pro 5RACH FOR TOWN III sart one of this course dear roperties and reactions leadiolysis of selected mate 5RMBM FOR TOWN III he first part, the sources afeguard and dozimetry. 5RAM FOR TOWN III he course gives a detaile halysis (IDA), substoichid last and resonance neutro 5RAM FOR TOWN III he course deals with the selection of the course deals with the selection of the course of selection of the course of selection of selection of selection of the course focuses on base art of the course involves as well as the description of lattice parameters, and hysico-chemical propertic 5VUCH1 FOR TOWN III hesis for internal defence | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the seading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine so fionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radionallytical Methods adverview of all main radioanalytical methods, specifically: Indicator methods, analysis by metric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, at ons, irradiation with charged particles and gamma-rays, non-activation interaction analysis at the separation physicochemical behaviour of very low concentrations (traces) of matters of their study. It presents detailed discussion of formation and properties of colloidal form object of the lecture is also the distribution of traces in macroheterogeneous systems, particles, at the beginning the chemistry of complex compounds, its generation and erview of the separation methods and their comparison. Further, the fundamentals of liquic gether with ion-exchange chromatography, and other chromatographic methods are discumples. The whole lecture is oriented to utilization of these methods in nuclear and radioch collids asic properties of solid materials resulting from their crystalline structure and on character is introduction to crystallography, chemical bonds in solids, crystal structure and its descript of different X-ray types based on their production mechanism, and methods for their decing, X-ray diffraction instrumentation, various measurements methods such as Laues methol. Project 1 a. | absorption of ioni I. The part two (si I. The | of IR with man, radiodiagnally occurring, irradiation nuclides, in I s and of me ecipitation, extraction of g theoretical antages and part, the stall methodion, quantita | g radioactive with therma s, PIXE, RB nomogeneou thods of wor adsorption a ded with specific relates, all aspects of dispecific relates, or open thods of words and powde attive analysisutron diffractive analysisutron diffractive and powde attive analysisutron diffractive analysisutron diffractive and powde attive analysisutron diffractive analysisutron dif | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micrors with solution calculation calculation calculation calculation of selection of selection of selection of computation of computation of selections of computation of selections of computation of selections of computation of selections of selections of selections of selections of selections of selections. | 4 4 2 2 2 2 2 2 2 3 3 4 3 4 3 4 4 4 4 4 4 4 |
| The internship aims at properties and reactions is designed and resonance neutrons. The course deals and resonance neutrons (IDA), substoiching at and resonance | nternship widing the student with practical experience. Radiation Chemistry als with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the seading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well erial systems. Radiation Methods in Biology and Medicine so fionizing radiation (IR) used in biology and medicine are thoroughly discussed. Descript structures and organisms follows. The last part of the course is dedicated to theory of radionallytical Methods adverview of all main radioanalytical methods, specifically: Indicator methods, analysis by constructure and organisms follows. Tadiometric titrations, radio-release methods, RIA, at open trice IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, at open trice IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, at open trice IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, at open trice IDA, radio-reagent methods and gamma-rays, non-activation interaction analysis are state (speciation) and physicochemical behaviour of very low concentrations (traces) of matter as of their study. It presents detailed discussion of formation and properties of colloidal form object of the lecture is also the distribution of traces in macroheterogeneous systems, particle and the separation methods in Nuclear Chemistry 1 veral chapters, at the beginning the chemistry of complex compounds, its generation and erview of the separation methods and their comparison. Further, the fundamentals of liquic gether with ion-exchange chromatography, and other chromatographic methods are discusples. The whole lecture is oriented to utilization of these methods in nuclear and radioch solids sic properties of solid materials resulting from their crystalline structure and on character is introduction to crystallography, chemical bonds in solids, crystal structure and its descrip of different X-ray types based on their production mechanism, and methods | absorption of ioni I. The part two (si I. The | of IR with man, radiodiagnally occurring, irradiation nuclides, in I s and of me ecipitation, extraction of g theoretical antages and part, the stall methodion, quantita | g radioactive with therma s, PIXE, RB nomogeneou thods of wor adsorption a ded with specific relates, all aspects of dispecific relates, or open thods of words and powde attive analysisutron diffractive analysisutron diffractive and powde attive analysisutron diffractive analysisutron diffractive and powde attive analysisutron diffractive analysisutron dif | ZK s. General comistry) is described by the selements, I neutrons, S. ZK us and micror with solution calculation calculation calculation calculation of selection of selection of selection of computation of selection of selection. | 4 4 overview of the edicated to the edicated to the edicated to the edicated to the edicated method of the edicated of the edica |

Code of the group: NMSPJCH2

Name of the group: MDP P_JCHN 2nd year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 5 courses

Credits in the group: 0 Note on the group:

| vote on the (| g. 5 a p. | | | | | |
|---------------|--|------------|---------|-------|----------|------|
| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| 15NUK1 | Aplication of Radionuclides 1 Ji í Mizera Ji í Mizera Ji í Mizera (Gar.) | ZK | 3 | 2+0 | Z | Р |
| 15DPCH1 | Master Thesis 1 Barbora Drtinová, Lenka Prouzová Procházková, Kate ina ubová, Pavel Bartl, Mojmír N mec, Jan John, Martin Da o, Martina Benešová-Schäfer, Martin Vlk Jan John Jan John (Gar.) | _ | 10 | 10 | Z | Р |
| 15DPCH2 | Master Thesis 2 Barbora Drtinová, Lenka Prouzová Procházková, Kate ina ubová, Pavel Bartl, Mojmír N mec, Jan John, Petr Distler, Martin Da o, Martina Benešová-Schäfer, Lenka Prouzová Procházková Jan John (Gar.) | _ | 20 | 20 | ٦ | Р |
| 15SEMA1 | Seminar 1 Kate ina ubová Kate ina ubová (Gar.) | Z | 3 | 3S | Z | Р |
| 15SEMA2 | Seminar 2 Kate ina ubová Kate ina ubová (Gar.) | Z | 3 | 3S | L | Р |

Characteristics of the courses of this group of Study Plan: Code=NMSPJCH2 Name=MDP P_JCHN 2nd year

| 15NUK1 | Aplication of Radionuclides 1 | ZK | 3 |
|--------------------------|---|--------------------|--------------------|
| In the introduction, nuc | lear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working | g methods in radio | chemistry. The |
| 1 | duce separately physical principles and practical applications of radiochronometry, methods based on chemical, biological and p ope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides are pre | • | onizing radiation, |
| 15DPCH1 | Master Thesis 1 | Z | 10 |
| Diploma work. | | | • |
| 15DPCH2 | Master Thesis 2 | Z | 20 |
| Diploma work. | | | |
| 15SEMA1 | Seminar 1 | Z | 3 |
| Getting acquainted wit | advanced radiochemical and radiation-chemical topics. | | ' |
| 15SEMA2 | Seminar 2 | Z | 3 |
| Get acquainted with ra | diochemical and radiation problems. | | , |

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 2

The role of the block: PV

Code of the group: NMSPJCHB1

Name of the group: MDP P JCHN Required optional corses block 1

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 3 courses

Credits in the group: 0

Note on the group:

Student absolvuje aspoň 1 blok povinně volitelných předmětů.

| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
|--------|---|------------|---------|-------|----------|------|
| 15CHRP | Chemistry of Radioactive Elements Jan John Jan John Jan John (Gar.) | ZK | 2 | 2+0 | Z | PV |
| 15TPC | Technology of Fuel Cycles of Nuclear Power Stations Kate ina ubová, Karel Štamberg Kate ina ubová Kate ina ubová (Gar.) | ZK | 2 | 2+0 | Z | PV |
| 15VJZ | Decomissioning of Nuclear Facilities Kate ina ubová Kate ina ubová (Gar.) | ZK | 2 | 2+0 | L | PV |

Characteristics of the courses of this group of Study Plan: Code=NMSPJCHB1 Name=MDP P_JCHN Required optional corses block

| • | | | |
|-------------------------|---|--------------------|------------------|
| 15CHRP | Chemistry of Radioactive Elements | ZK | 2 |
| The course gives a deta | alled overview of chemical properties of all known radioactive elements from the group of cis-uranium elements, actinoids and | d trans-actinoids. | |
| 15TPC | Technology of Fuel Cycles of Nuclear Power Stations | ZK | 2 |
| At first the besietunes | furnium area and their elegation and physical and redismetric are dressing methods are enestind. The main attention is | naid ta tha ahami | اممنه مام مام ما |

At first, the basic types of uranium ores and their classification, and physical and radiometric ore dressing methods are specified. The main attention is paid to the chemical-technological operations by means of which the products of technical grade and then of nuclear grade, as metallic U, UO2, UN, UC and UF6, are obtained. In this domain, the sol-gel processes and uranium isotopes separations are implicated. The manufacturing of fuel elements, based on metallic uranium, on tablets of UO2 or MOX fuel (UO2+PuO2), and of assemblies for basic types of nuclear reactors (LWR, FBR and HTGR) is described. The principles of spent fuel reprocessing and of radioactive wastes treatment are mentioned, too.

Decomissioning of Nuclear Facilities

1. History, situation, long-term operation. 2. Strategy of decomissioning. 3. Stages of decomissioning. 4. Legislation 5. Costs 6. Treatment of the waste: characterization, inventory of

Code of the group: NMSPJCHB2

Name of the group: MDP P_JCHN Required optional courses block 2

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 3 courses

Credits in the group: 0

radionuclides, storage and storage

Note on the group:

Student absolvuje aspoň 1 blok povinně volitelných předmětů.

| 0 1 | | | | | | |
|--------|---|------------|---------|-------|----------|------|
| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| 15MSZP | Modelling and Simulation of Radionuclide Migration in the Environment Aleš Vetešník, Dušan Vopálka Aleš Vetešník Dušan Vopálka (Gar.) | Z,ZK | 3 | 2+1 | Z | PV |
| 15ZOCH | Protection of Environment Helena Filipská Helena Filipská (Gar.) | ZK | 2 | 2+0 | Z | PV |
| 15SRZP | Determination of Radionuclides in Environment Mojmír N mec Mojmír N mec Mojmír N mec (Gar.) | ZK | 2 | 2+0 | L | PV |

Characteristics of the courses of this group of Study Plan: Code=NMSPJCHB2 Name=MDP P_JCHN Required optional courses block

15MSZP Modelling and Simulation of Radionuclide Migration in the Environment Z.ZK Introduction in ecological modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer models, characterization of their qualities. Models of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the PHREEQC environment. Simulation exercises with transport codes prepared in the GoldSim environment.

Protection of Environment

The course provides basic information about detrimental pollutants, about their impact on flora and fauna including man. It presents overview on the environmental sampling, sample analysis in order to control the concentrations and pollutant migration, determining the limits and environmental legislation. The migration of pollutants in the environment and possible ways of the environment protection and pollution prevention will be discussed

Determination of Radionuclides in Environment

The introduction of the lecture consit of the list of the important and monitored radionuclides in the environment and their abundance. Sample types, sampling and pre-treatment of samples are discussed followed with quality assurance of analysis and their relation. The attention is also paid to individual instrumental separation methods for environmental samples such as gamma-ray spectrometry and gross alpha and beta activities measurement. Finally, the methods for determination of the selected radionuclides (isotopes of uranium and plutonium, 210Po, 210Pb, 226Ra, 222Rn, 3H, 14C, 85Kr, 131I, 137Cs, 90Sr) are discussed.

Code of the group: NMSPJCHB3

Name of the group: MDP P_JCHN Required optional courses block 3

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 3 courses

Credits in the group: 0

Note on the group:

Student absolvuje aspoň 1 blok povinně volitelných předmětů.

| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
|--------|---|------------|---------|-------|----------|------|
| 15CHRP | Chemistry of Radioactive Elements Jan John Jan John Jan John (Gar.) | ZK | 2 | 2+0 | Z | PV |
| 15PRN | Radionuclide Production Ond ej Lebeda Ond ej Lebeda (Gar.) | ZK | 2 | 2+0 | Z | PV |
| 15RDFM | Radiopharmaceuticals 1 Ond ej Lebeda Ond ej Lebeda (Gar.) | ZK | 2 | 2+0 | Z | PV |

Characteristics of the courses of this group of Study Plan: Code=NMSPJCHB3 Name=MDP P_JCHN Required optional courses block

| 15CHRP | Chemistry of Radioactive Elements | ZK | 2 | | | |
|---|---|---------------------|------------------|--|--|--|
| The course gives a deta | alled overview of chemical properties of all known radioactive elements from the group of cis-uranium elements, actinoids an | d trans-actinoids. | | | | |
| 15PRN | Radionuclide Production | ZK | 2 | | | |
| An overview of the differ | ent ways in which radionuclides may be produced (natural sources, nuclear reactions, generators). Classification of nuclear rea | actions (neutron, c | harged particles | | | |
| and photon induced reactions, their course, cross-sections). Calculations of radionuclide yields and their modelling for different production set-ups. Design and operation of target | | | | | | |
| systems (solid, liquid and gaseous). Target processing with respect to the subsequent use of the produced radionuclide. Radionuclides generators, production, and their use. | | | | | | |
| 15RDFM | Radiopharmaceuticals 1 | ZK | 2 | | | |

The course introduces fundamentals of nuclear chemistry applications in research, development and production of radiopharmaceuticals. The first part of the course is focused on issues of appropriate radionuclide selection, general requirements for PET and SPECT diagnostics and therapeutic radiopharmaceuticals, ways of their application and labelling chemistry. The second part of the course provides fundamentals of routine production and quality control of radiopharmaceuticals (GMP rules) and discusses in detail production of a few particular radiopharmaceuticals. In the end of the course, students will learn about the last trends in the research of radiopharmaceuticals.

Code of the group: NMSPJCHPV1

Name of the group: MDP P JCHN Required optional courses

Requirement credits in the group: In this group you have to gain at least 2 credits

Requirement courses in the group:

Credits in the group: 2

Note on the group:

Student získá během studia aspoň 2 kredity z této skupiny předmětů.

| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
|--------|---|------------|---------|-------|----------|------|
| 15NUK2 | Aplication of Radionuclides 2 Ji í Mizera Ji í Mizera Ji í Mizera (Gar.) | ZK | 3 | 2+0 | L | PV |
| 15CHJE | The Chemistry of Operation of Nuclear Power Plants Barbora Drtinová Barbora Drtinová (Gar.) | ZK | 2 | 2+0 | Z | PV |
| 16RBIO | Radiobiology Marie Davídková Marie Davídková (Gar.) | ZK | 2 | 2+0 | L | PV |
| 15RFM2 | Radiopharmaceuticals 2 Martin Vlk, Ján Kozempel, Marek Moša Martin Vlk Ján Kozempel (Gar.) | ZK | 2 | 2+0 | Z | PV |
| 15SMJ2 | Separation Methods in Nuclear Chemistry 2 Mojmír N mec Mojmír N mec Mojmír N mec (Gar.) | ZK | 2 | 2+0 | L | PV |
| 15TRF | Radiopharmaceuticals Technology Martin Vlk, Ján Kozempel Martin Vlk Ján Kozempel (Gar.) | ZK | 2 | 2+0 | L | PV |
| 15UFCB | Introduction to Photochemistry and Photobiology Lenka Prouzová Procházková, Libor Juha Lenka Prouzová Procházková Libor Juha (Gar.) | ZK | 2 | 2+0 | Z | PV |

Characteristics of the courses of this group of Study Plan: Code=NMSPJCHPV1 Name=MDP P_JCHN Required optional courses

Aplication of Radionuclides 2 The course is oriented to applications of nuclear methods and radionuclides, particularly in the field scientific research. The first part of the course presents production and application of artificial radionuclides, labeled organic compounds, and generators of short-lived radionuclides. Another part of the course focuses on isotope exchange reactions and methods of their investigation. It is followed by explanation of thermodynamic and kinetic isotopic effects. The remaining lectures are devoted to applications of nuclear methods in general and physical chemistry to study kinetics and mechanism of chemical reactions, structure of chemical compounds, solid phase surfaces, catalysis, and to determine physico-chemical

15CHJE The Chemistry of Operation of Nuclear Power Plants

2 ZK

At first, the principles of water treatment processes, the sources of radioactive contamination and the principles of the treatment of all types of wastes are discussed. The main attention is paid to the individual technological operations used to the purification of feeding waters and cooling circuits waters and of all liquid and gaseous radioactive media encountered in NPP. The technological operations used to the treatment of wastes and the corrosion problems of the construction materials are discussed in detail, too.

16RBIO Radiobiology

parameters.

ZK

The presented lectures are aimed at basis of radiation biology. Students are introduced into biological effects of ionizing radiation; physical and chemical processes of radiation action in biological material; mechanisms of radiation damage to DNA and other cell components; types of damages and their repair; subcellular and cellular sensitivity and response to irradiation; physical, biological and chemical modificators of the cell response to irradiation; theories and models for cell survival and radiation biology of normal and neoplastic tissue systems

15RFM2 Radiopharmaceuticals 2

ZK

The basic principles of nuclear chemistry. A survey of radionuclides used in nuclear medicine. The common methods of radiopharmaceuticals preparations. Quality and control of

15SMJ2 Separation Methods in Nuclear Chemistry 2

radiopharmaceuticals. The basic radiopharmaceuticals and their use in human diagnostic and therapy.

ZK

2

The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification and description of the ion-pair formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange resins including accesories and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochromatography, distillation and electrochemical methods

15TRF Radiopharmaceuticals Technology

ZK

2

1. Research and development of radiopharmaceuticals, preclinical and clinial studies. 2. Raw materials and precursors of radiopharmaceuticals. 3. Specificity of radiopharmaceuticals preparation and production. 4. Sources of radionuclides, target systems and apparatuses (gaseous, liquid, solid), natural and enriched materials, their recycling. 5. Manipulation with high activities, biological shielding. Automated synthesisers (dedicated/universal, separation modules, microfluidic systems, proces parameters sensors, etc.). 6. Sterile and non-sterile preparations. Dispensing, formulation, sterilization and marking. 7. Pharmacopoeia and proces quality control methods of radiopharmaceuticals. 8. Processes validation, quality assurance and management systems, documentation. 9.Logistics of radiopharmaceuticals production. 10.Legislation requirements for radiopharmaceuticals preparation and production.

15UFCB Introduction to Photochemistry and Photobiology

At the beginning, an absorption of UV/vis radiation in molecular system and the energy transfer is explained and discussed. Then, photochemical laws and quantum yields of photochemical reactions are defined. Experimental techniques in photochemistry are reviewed. The light is also shed on the relationship between photochemistry and radiation chemistry / plasma chemistry. Classes and nature of different photochemical reactions are described in general. Within a part of the course devoted to the systematic photochemistry, the key reactions of illuminated inorganic, coordination, organometallic, organic and bio-organic compounds are reviewed. Practical utilization of photochemical reactions is summarized (photography, photolithography, photochemical syntheses, environmental photochemistry, etc.). Fundamentals of biological action of UV/vis radiation are exposed in the course. Special attention is paid to photosynthesis, vision, and photodynamic therapy.

Name of the block: Elective courses Minimal number of credits of the block: 0

The role of the block: V

Code of the group: NMSPJCHV

Name of the group: MDP P_JCHN Optional courses Requirement credits in the group: Requirement courses in the group: Credits in the group: 0

Note on the group:

| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
|---------|---|------------|---------|-------|----------|------|
| 15AODPA | Waste Analysis Ji í Hendrych Ji í Hendrych (Gar.) | Z,ZK | 3 | 2P+1C | Z | V |
| 15APRM | Application of Radiation Methods Viliam Mú ka Viliam Mú ka Viliam Mú ka (Gar.) | ZK | 2 | 2+0 | L | ٧ |
| 15ASCH | Astrochemistry Martin Ferus Martin Ferus (Gar.) | ZK | 2 | 2+0 | L | V |
| 16BAF | Biochemistry and Pharmacology Jan Ková Jan Ková (Gar.) | ZK | 2 | 2+0 | 1 | V |
| 15FCH5 | Physical Chemistry 5 Lenka Prouzová Procházková Lenka Prouzová Procházková (Gar.) | ZK | 2 | 2+0 | Z | V |
| 15GIMCH | Glycoconjugates and Immunochemistry Petr Pompach Petr Pompach (Gar.) | ZK | 3 | 2+0 | L | V |
| 15HCHEA | Hydrochemistry | Z,ZK | 5 | 3P+2C | L | V |
| 15HYPEA | Hydrology and Pedology Dana Pokorná Dana Pokorná Dana Pokorná (Gar.) | Z,ZK | 3 | 2P+1C | Z | V |
| 15ISY | Isotopic Syntheses Martin VIk, Ján Kozempel Martin VIk Ján Kozempel (Gar.) | ZK | 2 | 2+0 | L | V |
| 16MCRF | Monte Carlo Method in Radiation Physics Tomáš Urban Tomáš Urban Tomáš Urban (Gar.) | Z,ZK | 4 | 2+2 | 2 | V |
| 15PRMB | Practical Exercises in Radiation Methods in Biology and Medicine Martin VIk, Ján Kozempel Martin VIk Ján Kozempel (Gar.) | KZ | 4 | 0+4 | L | V |
| 15PRAM | Practical Exercises in Radioanalytical Methods Miroslava Semelová, Pavel Bartl, Mojmír N mec Miroslava Semelová Mojmír N mec (Gar.) | KZ | 4 | 0+4 | L | V |
| 16RAO | Radiation Protection Ji í Martin ík, Darina Trojková, Ji í H Ika, Ladislav Tomášek, Tomáš Trojek Ji í Martin ík Tomáš Trojek (Gar.) | ZK | 4 | 4+0 | 1 | ٧ |
| 01SUP | Start-up Project P emysl Rubeš P emysl Rubeš (Gar.) | KZ | 2 | 2P+0C | | ٧ |
| 01SME | Statistical methods with applications Tomáš Hobza Tomáš Hobza Tomáš Hobza (Gar.) | KZ | 2 | 2+0 | | ٧ |
| 15STA | Structure Analysis 1 Martin VIk, Ján Kozempel Martin VIk Ján Kozempel (Gar.) | Z,ZK | 3 | 2+1 | L | ٧ |
| 15NMR | Structure Analysis 2 Martin Vlk, Ján Kozempel Martin Vlk Ján Kozempel (Gar.) | Z,ZK | 3 | 2P+1C | Z | V |
| 15TZOA | Waste Management and Treatment | ZK | 3 | 3P | L | V |
| 15TZRCH | Theoretical Foundations of Radiation Chemistry Libor Juha Libor Juha (Gar.) | ZK | 2 | 2+0 | Z | V |
| 15ZFRM | General Pharmacology Stanislav Smr ek Stanislav Smr ek (Gar.) | ZK | 2 | 2P | | V |

| Characteristics of the courses of this group of Study Plan: Code=NMSPJCHV Name=MDP P_JCHN Optional courses 15AODPA Waste Analysis Z,ZK 3 The course is focused on waste characterization, sampling, pre-treatment and treatment of samples, their processing and analysis of components limited in legislative regulations and other methods of matrices characterization. Theoretical principles, instrumentation and practical design of tests according to standardized and modified methods, expression of results and their interpretation are explained. 15APRM Application of Radiation Methods ZK 2 The beginning part is devoted to the quantities and units of interaction of ionizing radiation with matter, the description of radiation sources and facilities. Next chapters are devoted to radiation technologies such as sterilization, cross-linking and degradation of polymers, polymerization, grafting and curing, radiation treatment of agricultural products, radiation synthesis, Last but not least, attention is devoted also to radiation processing in environment, , radiation in medical applications, economic considerations and dosimetry in context of safety. 15ASCH Astrochemistry Astrochemistry Astrochemistry Astrochemistry Biochemistry and Pharmacology Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis,galvanic cells, corrosion. Methods of the reduction of equilibrium thermodynamic data to the zero ionic strength. | 15ZFRM | General Pharmacology Stanislav Smr ek Stanislav Smr ek (Gar.) | ZK | 2 | 2P | | V |
|---|------------------------------|--|------------------------|---------------|-------------------|--------------|------------------|
| The course is focused on waste characterization, sampling, pre-treatment and treatment of samples, their processing and analysis of components limited in legislative regulations and other methods of matrices characterization. Theoretical principles, instrumentation and practical design of tests according to standardized and modified methods, expression of results and their interpretation are explained. 15APRM Application of Radiation Methods Application of Radiation Methods ZK 2 The beginning part is devoted to the quantities and units of interaction of ionizing radiation with matter, the description of radiation sources and facilities. Next chapters are devoted to radiation technologies such as sterilization, cross-linking and degradation of polymers, polymerization, grafting and curing, radiation treatment of agricultural products, radiation synthesis, Last but not least, attention is devoted also to radiation processing in environment, radiation in medical applications, economic considerations and dosimetry in context of safety. 15ASCH Astrochemistry ZK 2 The aim of this lecture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology ZK 2 Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry | Characteristics of | the courses of this group of Study Plan: Code=NMSPJCHV Nam | ne=MDP P_JC | HN Optic | nal course | es | |
| other methods of matrices characterization. Theoretical principles, instrumentation and practical design of tests according to standardized and modified methods, expression of results and their interpretation are explained. 15APRM Application of Radiation Methods The beginning part is devoted to the quantities and units of interaction of ionizing radiation with matter, the description of radiation sources and facilities. Next chapters are devoted to radiation technologies such as sterilization, cross-linking and degradation of polymers, polymerization, grafting and curing, radiation treatment of agricultural products, radiation synthesis, Last but not least, attention is devoted also to radiation processing in environment, radiation in medical applications, economic considerations and dosimetry in context of safety. 15ASCH Astrochemistry Astrochemistry The aim of this lecture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | 15AODPA | Waste Analysis | | | Z,2 | ZK | 3 |
| and their interpretation are explained. 15APRM Application of Radiation Methods The beginning part is devoted to the quantities and units of interaction of ionizing radiation with matter, the description of radiation sources and facilities. Next chapters are devoted to radiation technologies such as sterilization, cross-linking and degradation of polymers, polymerization, grafting and curing, radiation treatment of agricultural products, radiation synthesis, Last but not least, attention is devoted also to radiation processing in environment, radiation in medical applications, economic considerations and dosimetry in context of safety. 15ASCH Astrochemistry Astrochemistry Astrochemistry Biochemistry and Pharmacology of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. Biochemistry and Pharmacology According overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | The course is focused of | on waste characterization, sampling, pre-treatment and treatment of samples, their proces | ssing and analysis | of compone | nts limited in le | gislative r | egulations and |
| The beginning part is devoted to the quantities and units of interaction of ionizing radiation with matter, the description of radiation sources and facilities. Next chapters are devoted to radiation technologies such as sterilization, cross-linking and degradation of polymers, polymerization, grafting and curing, radiation treatment of agricultural products, radiation synthesis, Last but not least, attention is devoted also to radiation processing in environment, radiation in medical applications, economic considerations and dosimetry in context of safety. 15ASCH Astrochemistry Astrochemistry Astrochemistry Astrochemistry The aim of this lecture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology ZK 2 Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Szk 2 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis,galvanic cells, corrosion. | | | according to standa | rdized and r | nodified metho | ds, expres | ssion of results |
| radiation technologies such as sterilization, cross-linking and degradation of polymers, polymerization, grafting and curing, radiation treatment of agricultural products, radiation synthesis, Last but not least, attention is devoted also to radiation processing in environment, radiation in medical applications, economic considerations and dosimetry in context of safety. 15ASCH Astrochemistry The aim of this lecture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | 15APRM | Application of Radiation Methods | | | Z | K | 2 |
| Last but not least, attention is devoted also to radiation processing in environment, , radiation in medical applications, economic considerations and dosimetry in context of safety. 15ASCH Astrochemistry ZK 2 The aim of this lecture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology ZK 2 Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 ZK 2 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | The beginning part is d | evoted to the quantities and units of interaction of ionizing radiation with matter, the descr | ription of radiation s | sources and | facilities. Next | chapters | are devoted to |
| 15ASCH Astrochemistry The aim of this lecture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | radiation technologies s | uch as sterilization, cross-linking and degradation of polymers, polymerization, grafting and | curing, radiation tr | eatment of a | gricultural prod | lucts, radia | ation synthesis, |
| The aim of this lecture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our solar system, interstellar clouds, origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | Last but not least, atter | tion is devoted also to radiation processing in environment, , radiation in medical applicat | tions, economic co | nsiderations | and dosimetry | / in contex | t of safety. |
| origin of life, interstellar compounds detection techniques and history of astrochemistry. 16BAF Biochemistry and Pharmacology ZK 2 Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | 15ASCH | Astrochemistry | | | Z | K | 2 |
| 16BAF Biochemistry and Pharmacology Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | The aim of this lecture | is to summarize present knowledge of chemistry in the universe. The lecture should be fo | cused mainly on cl | nemistry of c | our solar syste | m, interste | ellar clouds, |
| Concise overview of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, kidneys and urine, biochemical significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis,galvanic cells, corrosion. | origin of life, interstellar | compounds detection techniques and history of astrochemistry. | | | | | |
| significance of liver, metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmaceuticals, their absorption, distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis,galvanic cells, corrosion. | 16BAF | Biochemistry and Pharmacology | | | Z | K | 2 |
| distribution and elimination, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparations, conditions for such products and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis,galvanic cells, corrosion. | Concise overview of org | ganic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, bio | chemistry of diges | tion and res | orption, kidney | s and urin | ne, biochemical |
| and for their fabrication. 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis,galvanic cells, corrosion. | significance of liver, met | tabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of p | pharmacology - bio | transformati | on of pharmac | euticals, th | neir absorption, |
| 15FCH5 Physical Chemistry 5 Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis,galvanic cells, corrosion. | distribution and elimina | tion, pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiophar | maceuticals and d | agnostic pre | parations, cor | iditions for | r such products |
| Selected chapters of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analysis, galvanic cells, corrosion. | and for their fabrication | | | | | | |
| | 15FCH5 | Physical Chemistry 5 | | | Z | K | 2 |
| Methods of the reduction of equilibrium thermodynamic data to the zero ionic strength. | Selected chapters of el | ectrochemistry and theory of solutions. Electrode phenomena, electric double layer, elect | rochemical method | ls in chemic | al analysis,gal | vanic cells | s, corrosion. |
| | Methods of the reduction | on of equilibrium thermodynamic data to the zero ionic strength. | | | | | |

15GIMCH Glycoconjugates and Immunochemistry The course is focused on the history and present of immunochemistry and molecular immunology. The most important molecules of immunity system are thoroughly discussed (antibody, T-cell receptor, HLA antigens, complement, adhesive molecules) as well as technical aspects of experimental immunology techniques, details of immunology measurements and appropriate instrumentation 15HCHEA Hydrochemistry 15HYPEA Hydrology and Pedology Z.ZK 3 Hydrology is the discipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water on, above and below the earth's surface. The course includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications are presented for water quantity considerations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and ground water is also presented. 15ISY Isotopic Syntheses In the general part of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled compounds, basic principles of safety and specific requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounds and methods of structural, isotopic and radiometric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automated syntheses, biosyntheses. In the systematic part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applications of labelled compounds. 16MCRF Monte Carlo Method in Radiation Physics Basic principles of the MC method, probability theory and selected concepts in mathematical statistics. Ionising radiation transport simulation, photons, neutrons and charged particles interactions and their simulation, modelling of the geometric conditions. Statistical tests of the model calculations, variance reduction techniques. Codes for simulation of radiation transport, MCNP(X) code, properties and scope of usage, input file (description of the geometry, materials, sources, tallies), graphical tools, code user control. Tools for input fines creation/editing a visualization (VISED, Sabrina, Body Builder). Examples of application (practical training) concentrated on radiation physics (shielding, radiation fields/beams/sources, spectral/spatial distributions of the dosimetric quantities, responses of detection systems, radiation protection tasks. The basics of working with the program Fluka and Geant, SRIM code for simulation of the transport of charged particles. Practical Exercises in Radiation Methods in Biology and Medicine Students get knowledge of practical work with mikroorganisms and ezymes, including preparation of samples for irradiation. They get knowledge of basic aspects of work with radionuclide generator, preparation of labelled compounds and determination of radiochemical purity. Practical Exercises in Radioanalytical Methods 15PRAM K7 4 Exercise is focused to practical carrying out of various radioanalytical methods from determination of solubility constant over radiometric titrations to determination of various radionuclides in the environment. It also includes substoichiometric diulution analysis, radioimmunological, rentgenfluorescence, and neutron activation analyses 16RAO Radiation Protection ZK The aim of the subject is to provide a self-contained overview of the radiation protection with a special focus on general principles. The subject is based on the actual ICRP recommendation no. 103 and other documents, which specifies radiation protection in the Czech Republic and EU. The course is accepted as training, which allows obtaining special competence in radiation protection. Participants will receive an appropriate certificate of attendance when fulfil all requirements defined in the permit of SONS. 01SUP Start-up Project ΚZ 2 01SME Statistical methods with applications ΚZ 2 The course consists of selected methods of statistical data analysis such as: linear regression and correlation, analysis of variance, nonparametric methods, contingency tables, simulation of random variables and their application. The aim is to illustrate the use of statistical procedures on examples. Solutions of concrete examples by use of statistical software are also included. 15STA Structure Analysis 1 Z,ZK Methods of molecular spectroscopy, fundamental principles. Nuclear magnetic resonance, 1H and 13C NMR techniques in organic structural analysis. Special techniques 2D NMR, COSY, HECTOR. Infrared spectroscopy, fundamental principles. Finger print and practical applications in analysis. UV-VIS spectroscopy, fundamental principles. Mass spectrometry, methods, ionization techniques, fragmentations, applications in structural analysis. Z,ZK 15NMR Structure Analysis 2 15TZOA Waste Management and Treatment ZK 3 15TZRCH Theoretical Foundations of Radiation Chemistry ZK 2 Theoretical description of an interaction of ionizing radiation with matter. Theory of primary processes in radiation chemistry: excitation and ionization. Recombination kinetics; charge and energy transfer in molecular systems. Inelastic electron scattering. Primary radiation chemical yields. Formation, structure and properties of solvated electrons. Track theory and models. Radiation chemical kinetics. Theory of an action of ionizing radiation in solids (electron-phonon interaction; radiation defects in crystals) and gases. State-of-matter effects in radiation chemical reactivity 157FRM General Pharmacology ZK The lecture deals with use of organic compounds in human pharmacotherapy. The relation between chemical constitution and biological activity is discussed. In the first part the basic subjects of general pharmacology (distribution in organisms, kinetic parameters, biotransformation, dose response etc.) are explained. The second one deals with pharmacological groups of therapeutically useful substances. The definition and explanation of common pharmacotherapeutical terms and a survey of pharmaceutics informatics and drug forms are

also involved

List of courses of this pass:

| Code | Name of the course | Completion | Credits | | |
|---|---------------------------------------|------------|---------|--|--|
| 01SME | Statistical methods with applications | KZ | 2 | | |
| The course consists of selected methods of statistical data analysis such as: linear regression and correlation, analysis of variance, nonparametric methods, contingency tables, | | | | | |
| simulation of random variables and their application. The aim is to illustrate the use of statistical procedures on examples. Solutions of concrete examples by use of statistical software | | | | | |
| are also included. | | | | | |
| 01SUP | Start-up Project | KZ | 2 | | |

The course is focused on waste characterization, sampling, pre-treatment and treatment of samples, their processing and analysis of components limited in legislative regulations and other methods of matrices characterization. Theoretical principles, instrumentation and practical design of tests according to standardized and modified methods, expression of results and their interpretation are explained.

7 7K

Waste Analysis

15AODPA

| | Application of Radiation Methods | ZK | 2 | |
|--|--|--|--|--|
| | is devoted to the quantities and units of interaction of ionizing radiation with matter, the description of radiation sources and facilities | . Next chapters are | devoted to | |
| radiation technologies such as sterilization, cross-linking and degradation of polymers, polymerization, grafting and curing, radiation treatment of agricultural products, radiation synthesis | | | | |
| Last but not least | t, attention is devoted also to radiation processing in environment, , radiation in medical applications, economic considerations and de | osimetry in context | of safety. | |
| 15ASCH | Astrochemistry | ZK | 2 | |
| The aim of this le | cture is to summarize present knowledge of chemistry in the universe. The lecture should be focused mainly on chemistry of our sola | ar system, interstell | ar clouds, | |
| | origin of life, interstellar compounds detection techniques and history of astrochemistry. | | | |
| 15CHJE | The Chemistry of Operation of Nuclear Power Plants | ZK | 2 | |
| | es of water treatment processes, the sources of radioactive contamination and the principles of the treatment of all types of wastes are | | | |
| | idual technological operations used to the purification of feeding waters and cooling circuits waters and of all liquid and gaseous radi | | ountered in | |
| | P. The technological operations used to the treatment of wastes and the corrosion problems of the construction materials are discussed. | | | |
| 15CHRP | Chemistry of Radioactive Elements | ZK | 2 | |
| | e gives a detailed overview of chemical properties of all known radioactive elements from the group of cis-uranium elements, actinoic | | | |
| 15DPCH1 | Master Thesis 1 | Z | 10 | |
| | Diploma work. | | | |
| 15DPCH2 | Master Thesis 2 | Z | 20 | |
| | Diploma work. | | | |
| 15EXK2 | Excursion 2 | Z | 1 | |
| | The excursion aims at mediating the students the acquaintance with various radiochemical and radiation methods used in pra- | | | |
| 15FCH5 | Physical Chemistry 5 | ZK | 2 | |
| Selected chapters | s of electrochemistry and theory of solutions. Electrode phenomena, electric double layer, electrochemical methods in chemical analy | ysis,galvanic cells, | corrosion. | |
| | Methods of the reduction of equilibrium thermodynamic data to the zero ionic strength. | | | |
| 15FCHA4 | Physical Chemistry 4 | Z,ZK | 4 | |
| · · | e Physical chemistry 4 devoted to reaction kinetics, the course is focused on the reaction rate, isolated reactions of various orders, simult | | _ | |
| | erature dependence of the rate constants. Hard-sphere collision theory, activated-complex theory and chemical dynamics are thorough | | e. The chain | |
| | ons of atoms and free radicals and reactions in liquid solutions are discussed, too. These subjects are trained by solving of selected in the second | | | |
| 15FCHN3 | Physical Chemistry 3 | Z,ZK | 2 | |
| 1 - | f the course, a general description and explanation of laws affecting behaviour of the particle systems is provided. Subsequently, par | = | | |
| molecular level. Fol | llows the study on the matter in motion, based on its inner structure, properties of structural elements, mutual interactions and force fi | ields. The course al | lso contains | |
| 450114011 | some practical applications and fundamental calculations. | 714 | | |
| 15GIMCH | Glycoconjugates and Immunochemistry | ZK | 3 | |
| | ed on the history and present of immunochemistry and molecular immunology. The most important molecules of immunity system are the | | | |
| i-ceii receptor, H | ILA antigens, complement, adhesive molecules) as well as technical aspects of experimental immunology techniques, details of imm | unology measurem | ients and | |
| 451101154 | appropriate instrumentation. | 7 71/ | _ | |
| 15HCHEA | Hydrochemistry | Z,ZK | 5 | |
| 1547067 | Hydrology and Pedology | | | |
| 15HYPEA | | Z,ZK | 3 | |
| Hydrology is the dis | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or | n, above and below | the earth's | |
| Hydrology is the dis surface. The course | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of e includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic | n, above and below ations are presente | the earth's ed for water | |
| Hydrology is the dis surface. The course quantity consid | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of e includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and ground | n, above and below eations are presented d water is also pres | the earth's ed for water sented. | |
| Hydrology is the dis surface. The course quantity consider 15ISY | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of e includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic derations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses | n, above and below ations are presented d water is also presented | the earth's ed for water sented. | |
| Hydrology is the dis surface. The course quantity consid 15ISY In the general part | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun sotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled of the lecture students are stable nuclides and radionuclides. | n, above and below ations are presented d water is also presented ZK compounds, basic p | the earth's ed for water sented. 2 principles of | |
| Hydrology is the dis surface. The course quantity consid 15ISY In the general part safety and specific | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun sotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled correquirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compound. | n, above and below ations are presented water is also presented ZK compounds, basic punds and methods of | the earth's ed for water sented. 2 principles of of structural, | |
| Hydrology is the dis surface. The course quantity consid 15ISY In the general part safety and specific isotopic and radiom | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun sotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounteric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automateric analyses. | n, above and below attions are presented water is also presented by a series of the se | the earth's ed for water sented. 2 principles of of structural, osyntheses. | |
| Hydrology is the dis surface. The course quantity consideration of the 15ISY In the general part safety and specific isotopic and radiom In the systematic | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounderric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automs part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applications. | n, above and below attions are presented water is also presented water is also presented water is also presented and methods of atted syntheses, biditions of labelled control and belied control. | with earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. | |
| Hydrology is the dis surface. The course quantity considerable of the 15ISY In the general part safety and specifical isotopic and radiom In the systematical | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled of requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled composite ric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autom a part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate Modelling and Simulation of Radionuclide Migration in the Environment | n, above and below rations are presented water is also presented water is also presented water is also presented someounds, basic pands and methods chated syntheses, bictions of labelled cor Z,ZK | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 | |
| Hydrology is the dis surface. The course quantity considerable of the 15ISY In the general part safety and specifical isotopic and radiom In the systematical 15MSZP Introduction in ecol | scipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounderric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automs part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applications. | n, above and below rations are presented water is also presented water is also presented water is also presented someounds, basic pands and methods or rated syntheses, bigins of labelled con Z,ZK rodels, characterizations. | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 attorn of their | |
| Hydrology is the dis surface. The course quantity considerable of the 15ISY In the general part safety and specifical isotopic and radiom In the systematical 15MSZP Introduction in ecol | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and ground Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled correquirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compound the processes are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automorphic part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer materials are particularly discussed. | n, above and below rations are presented water is also presented water is also presented water is also presented someounds, basic pands and methods or rated syntheses, bigins of labelled con Z,ZK rodels, characterizations. | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 attorn of their | |
| Hydrology is the dis surface. The course quantity consideral 15ISY In the general part safety and specifical isotopic and radiom In the systematical 15MSZP Introduction in ecologualities. Models | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounds analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autom a part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer models of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. | n, above and below rations are presented water is also presented water is also presented water is also presented someounds, basic punds and methods contacted syntheses, bictions of labelled contacted and the syntheses, bictions of labelled contacted by the purpose of labelled by the labelled by the purpose of labelled by the | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their rironment. | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounter analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automorphic part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer most dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 | n, above and below rations are presented water is also presented water is also presented water is also presented someounds, basic punds and methods of rated syntheses, bidions of labelled cores Z,ZK repended to the PHREEQC enveloped to the PHREEQC enveloped to the punch some presented to the punch some presen | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 attorn of their | |
| Hydrology is the dis surface. The course quantity consideration of the course quantity consideration of the surface and surface and radiom. In the systematic surface and surf | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounds analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autom a part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer models of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some process of the PHREEQC envelope and below th | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their rironment. | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounteric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automore part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer most dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some process of the PHREEQC envelopes of the PHREEQC envelo | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 ation of their ironment. 3 mistry. The | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and ground Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounter in analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automore part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer most dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methods. | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some process of the | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 ation of their ironment. 3 mistry. The | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and ground Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounter in analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automorphate of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate of the lecture, the isotope-specific methods of Radionuclide Migration in the Environment of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 In nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methoduce separately physical principles and practical applications of radiochronometry, methods based on chemical, biological and physical principles and practical applications of radiochronometry, methods based on chemical, biological and physical principles and practical applications of radiochronometry, methods based on chemical, biological and physical principles and practical applications of radiochronometry, methods based on chemical, biological and physical principles and practical applications of radiochronometry. | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some process of the | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 ation of their ironment. 3 mistry. The | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and ground Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounter in analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automore, part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 In nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides. | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some some some some some some some some | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 ation of their rironment. 3 mistry. The ng radiation, | |
| Hydrology is the dis surface. The course quantity consideration of the course quantity consideration of the course quantity consideration of the systematical state of the course is orient to the course is orient to design of the course in the course is orient to design of the course in the course is orient to design of the course in the course is orient to design of the course in the course | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of a includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounetric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automs part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer moof dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working matroduce separately physical principles and practical applications of radiochronometry, methods based on chemical, biological and physical methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides Aplication of Radionuclides 2 | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some some some some some some some some | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 ation of their rironment. 3 mistry. The ng radiation, 3 application | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of a includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled corequirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compountario analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automate the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated of the lecture, the isotope-specific methods of Radionuclide Migration in the Environment of discussed on the problems of radionuclide migration in the environment. Formulation of mathematical and computer most dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides Aplication of Radionuclides 2 ted to applications of nuclear methods and radionuclides, particularly in the field scientific research. The first part of the course presectides, labeled organic compounds, and generators o | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some production of labelled contacted syntheses, bid in the production of labelled contacted syntheses, characterized the PHREEQC envelopes are presented. ZK ents production and onge reactions and clear methods in general contacts. | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 ation of their rironment. 3 amistry. The ng radiation, methods of eneral and | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of a includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled compounts of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled compounts of the lecture students become familiar with the preparation of work with isotopes. Next, laboratory operations with labelled compounts of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of Radionuclide Migration in the Environment of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides, particularly in the field scientific research. The first | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some production of labelled contacted syntheses, bid in the production of labelled contacted syntheses, characterized the PHREEQC envelopes are presented. ZK ents production and onge reactions and clear methods in general contacts. | the earth's ed for water sented. 2 principles of of structural, posyntheses. mpounds. 3 ation of their rironment. 3 amistry. The ng radiation, methods of eneral and | |
| Hydrology is the dis surface. The course quantity consideration of the course quantity consideration of the course quantity consideration of the systematic safety and specific isotopic and radiom of the systematic system | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of a includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic derations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounteric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of Radionuclide Migration in the Environment of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles and practical applications of radiochronometry, methods based on chemical, biological and physitor methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides particularly in the field scientific research. The first part of the course focuses on isotope exch | n, above and below rations are presented water is also presented some production of labelled con the PHREEQC enverties are presented. ZK ents production and rage reactions and clear methods in gedetermine physico- | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and chemical | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water of a includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic derations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled component analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automater analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automater analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automater analyses are discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer models. Practical modelling in the solid sphase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides particularly in the field scientific research. The first part of t | n, above and below rations are presented water is also presented water is also presented water is also presented water is also presented some production of labelled contact of labelled c | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their rironment. 3 amistry. The ng radiation, methods of eneral and chemical | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic derations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled compounts of laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounteric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of Radionuclide Migration in the Environment or or dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working model and physication of physications of nuclear methods and radionuclides, particularly in the field scientific research. The first part of the course preseculates to applications of nuclear methods and radionuclides, particularly in the field | n, above and below rations are presented water is also presented syntheses, bit in sof labelled con the PHREEQC environment of the PHREEQC environment of the presented water presented. ZK water presented water presented water production and the production and the presented water presented water methods in gedetermine physico- | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and chemical | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounteric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application in the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application in deleting in the problems of radionuclide migration in the environment. Formulation of mathematical and computer most dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working matroduce separately physical principles and practical applications of radiochronometry, methods based on chemical, biological and physic tor methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides, labeled organic compounds, and | n, above and below rations are presented water is also presented syntheses, bit in sof labelled con the PHREEQC environment of the PHREEQC environment of the presented water presented. ZK water presented water presented water production and the production and the presented water presented water methods in gedetermine physico- | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and chemical | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic derations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounter or analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autom the part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of Radionuclide Migration in the Environment Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methodous esparately physical principles and practical applications of radionuclides 2 ted to applications of nuclear methods and radionuclides, particularly in the field scientific research. The first part of the course presectides, labeled organic compounds, and generators of short- | n, above and below rations are presented water is also presented syntheses, bit ions of labelled con Z,ZK represented water is also presented water is also presented. ZK represented water is a represented water is production and represented in gedetermine physico-label with thermal represented water is also with thermal represented water is a represented water is production and represented water is also water in the representation of the representation water is also water in the representation water in the representation water is also water in the representation water in the representation water is also water in the representation wate | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and chemical 4 Il neutron d principles | |
| Hydrology is the dis surface. The course quantity consideration of the surface and the surface | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic detations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled componential analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automs part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the solids phase, including sophisticated multi-component models. Practical modelling in the simulation of Radionuclides 1 Aplication of Radionuclides 1 Aplication of Radionuclides 1 Aplication of Radionuclides 2 ted to applications of nuclear methods and radionuclides, particularly in the field scientific research. The first part of the course presectides, labeled organic compounds, and generators of short-lived radionuclid | n, above and below rations are presented water is also presented syntheses, bit ions of labelled con Z,ZK represented water is also presented water is also presented. ZK represented water is a represented water is production and represented in generations and clear methods in generations and clear methods in generations and clear methods in generations with thermal clear water is also with the represented water is also water in the representation water in the representation water is also water in the representation water in the representation water is also water in the representation water in the representation water in the representation water is also water in the representation water i | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and chemical 4 Il neutron d principles 3 | |
| Hydrology is the dis surface. The course quantity consideration of the surface of | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applic derations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounter or analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autom the part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of Radionuclide Migration in the Environment Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methodous esparately physical principles and practical applications of radionuclides 2 ted to applications of nuclear methods and radionuclides, particularly in the field scientific research. The first part of the course presectides, labeled organic compounds, and generators of short- | n, above and below rations are presented water is also presented syntheses, bid in a second water is also presented water water is also water in a second water is a sec | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and echemical 4 an eutron diprinciples 3 e practical | |
| Hydrology is the dis surface. The course quantity considerate the course of artificial radionut of the course is orient of artificial radionut of the course | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun locations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun locations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun locations and runoff volume and rate management in the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounteric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autom part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicat Modelling and Simulation of Radionuclide Migration in the Environment of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working mitroduce separately physical principles and practical applications of radiochronometry, methods based on chemical, biological and physitor methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides, labeled organic compounds, and generators of short-lived radionuclides. Another part of the cou | n, above and below rations are presented water is also presented syntheses, bid in a solid syntheses, bi | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and echemical 4 an eutron d principles a practical es, chemical | |
| Hydrology is the dis surface. The course quantity considerate the course of artificial radionut of the course is orient of artificial radionut of the course | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compoure the canalyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autome part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the application of Radionuclide Migration in the Environment Modelling and Simulation of Radionuclide Migration in the Environment ogical modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer models of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides per prescribed and principles and practical processes and solve prescribed to applications of nuclear methods and radionuclides, particularly in the field scientific resea | n, above and below rations are presented water is also presented syntheses, bid in a solid syntheses, bi | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and echemical 4 an eutron d principles 9 practical es, chemical | |
| Hydrology is the dis surface. The course quantity considerate the course of artificial radionut of the course is orient of artificial radionut of the course | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or eincludes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrologic processes. Practical applicaterations and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled or requirements for laboratory equipment and experimental setup for work with isotopes. Next, laboratory operations with labelled compounteric analyses are discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, autom part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicated modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer modissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the Simulation exercises with transport codes prepared in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working m troduce separately physical principles and practical applications of radiochronometry, methods based on chemical, biological and physitor methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides 2 lated to applications of nuclear methods and radionuclides, particularly in the field scientific research. The first part of the course presecuides, labeled organic compounds, and generators of short-lived radionuclides. Another part of the course focuses on isotope exchange reactions, | n, above and below rations are presented water is also presented syntheses, bid in a solid syntheses, bi | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 amistry. The ng radiation, methods of eneral and echemical 4 an eutron d principles 9 practical es, chemical | |
| Hydrology is the dis surface. The course quantity considerate the surface of the | cipline used to understand and design water management systems that are directly and indirectly related to the occurrence of water or includes basic hydrology, emphasizing an understanding of concepts, principles and ideas of hydrology processes. Practical applications and runoff volume and rate management, infiltration and soil water processes. Hydrology of reservoirs, wetlands and groun Isotopic Syntheses of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled compounts of the lecture students become familiar with the preparation of enriched stable nuclides and radionuclides, nomenclature of labelled compounts of the lecture, the isotope specific methods of the most common elements are particularly discussed, together with specificity of carrier-added and carrier-free preparations, fast and online syntheses, automate part of the lecture, the isotope-specific methods of the most common elements are particularly discussed, together with the applicate Modelling focused on the problems of radionuclide migration in the environment. Formulation of mathematical and computer more of dissolved contaminants interaction with the solids phase, including sophisticated multi-component models. Practical modelling in the solids of the solid phase, including sophisticated multi-component models. Practical modelling in the solid solid phase in the solid sphase in the solid sphase in the GoldSim environment. Structure Analysis 2 Aplication of Radionuclides 1 , nuclear methods and their basic principles are generally classified. It is followed by explanation of the specific features of working methods, isotope exchange reactions and isotopic effects. The most important technical and industrial applications of radionuclides. Applications of nuclear methods, and generators and isotopic effects. The most important technical and industrial applications of radionuclides, labeled organic compounds, and generators of short-lived radionuclides. Another part | n, above and below rations are presented water is also presented water w | the earth's ed for water sented. 2 principles of of structural, osyntheses. mpounds. 3 ation of their ironment. 3 anistry. The ng radiation, methods of eneral and echemical 4 I neutron d principles a practical es, chemical nent oxides) | |

| 15PRAM Practical Exercises in Radioanalytical Methods | KZ | 4 |
|--|--|--|
| Exercise is focused to practical carrying out of various radioanalytical methods from determination of solubility constant over radiometric titrations to determine the province of the provin | | dionuclides |
| in the environment. It also includes substoichiometric diulution analysis, radioimmunological, rentgenfluorescence, and neutron activati | | 4 |
| 15PRMB Practical Exercises in Radiation Methods in Biology and Medicine Students get knowledge of practical work with mikroorganisms and ezymes, including preparation of samples for irradiation. They get knowledge of basic as | KZ | 4 |
| generator, preparation of labelled compounds and determination of radiochemical purity. | pects of work with ra | adionaciae |
| 15PRN Radionuclide Production | ZK | 2 |
| An overview of the different ways in which radionuclides may be produced (natural sources, nuclear reactions, generators). Classification of nuclear reaction | | |
| and photon induced reactions, their course, cross-sections). Calculations of radionuclide yields and their modelling for different production set-ups. De | sign and operation | of target |
| systems (solid, liquid and gaseous). Target processing with respect to the subsequent use of the produced radionuclide. Radionuclides generators, | | |
| 15RACH Radiation Chemistry | ZK | 4 |
| Part one of this course deals with the formation of Primary Intermediate Products of radiolysis (PIP) caused by the absorption of ionizing radiation in mat properties and reactions leading to the formation of Stable Products of Radiolysis (SPR) is given in this part as well. The part two (systematic radiation | | |
| radiolysis of selected material systems. | crierriisti y) is dedice | ated to the |
| 15RAEK | ZK | 2 |
| The first part of the course deals with general problems of the environment. Then composition of and natural processes in basic parts of biogeospere, biogeospere | eochemical cycles o | f elements |
| and natural environmental radioactivity are discussed in detail. The last part describes sources of environmental pollution, migration, chemical reactions | and effects of pollut | ants in the |
| environment and presents analysis of basic problems of radioecology. | | |
| 15RAM Radioanalytical Methods | ZK | 3 |
| The course gives a detailed overview of all main radioanalytical methods, specifically: Indicator methods, analysis by means of naturally occurring radioaca analysis (IDA), substoichiometric IDA, radio-reagent methods, radiometric titrations, radio-release methods, RIA, activation analysis, irradiation with the | | |
| fast and resonance neutrons, irradiation with charged particles and gamma-rays, non-activation interaction analysis, X-ray fluorescence ana | | iation with |
| 15RDFM Radiopharmaceuticals 1 | ZK | 2 |
| The course introduces fundamentals of nuclear chemistry applications in research, development and production of radiopharmaceuticals. The first par | t of the course is foo | cused on |
| issues of appropriate radionuclide selection, general requirements for PET and SPECT diagnostics and therapeutic radiopharmaceuticals, ways of the | | |
| chemistry. The second part of the course provides fundamentals of routine production and quality control of radiopharmaceuticals (GMP rules) and disc | • | uction of a |
| few particular radiopharmaceuticals. In the end of the course, students will learn about the last trends in the research of radiopharma | | 2 |
| 15RFM2 Radiopharmaceuticals 2 The basic principles of nuclear chemistry. A survey of radionuclides used in nuclear medicine. The common methods of radiopharmaceuticals prepara | ZK | |
| radiopharmaceuticals. The basic radiopharmaceuticals and their use in human diagnostic and therapy. | and to | Ontroi or |
| 15RMBM Radiation Methods in Biology and Medicine | ZK | 2 |
| In the first part, the sources of ionizing radiation (IR) used in biology and medicine are thoroughly discussed. Description of interaction of IR with matter and | d influence of ionizin | g radiation |
| on biologically important structures and organisms follows. The last part of the course is dedicated to theory of radiobiological action, radiodiagnostic and | d radiotherapeutica | I methods, |
| safeguard and dozimetry. | | |
| 15SEMA1 Seminar 1 | Z | 3 |
| Catting appropriated with advanced radiophamical and radiotion abamical tanica | | |
| Getting acquainted with advanced radiochemical and radiation-chemical topics. Seminar 2 | 7 | 3 |
| 15SEMA2 Seminar 2 | Z | 3 |
| 15SEMA2 Seminar 2 Get acquainted with radiochemical and radiation problems. | | |
| 15SEMA2 Seminar 2 | KZ | 3 |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in | KZ on at work with radiorevious laboratory | 3 ionuclides. exercises. |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with | KZ on at work with radiorevious laboratory | 3 ionuclides. exercises. |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. | KZ on at work with radi orevious laboratory open radioactive so | 3 ionuclides. exercises. urces and |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 | KZ on at work with radiorevious laboratory open radioactive so | 3 ionuclides. exercises. urces and |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. | KZ on at work with radionevious laboratory open radioactive so ZK speciation calculation | 3 ionuclides. exercises. urces and 3 ons. Next |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with | KZ on at work with radionevious laboratory open radioactive so ZK speciation calculations, extraction chrome | 3 ionuclides. exercises. urces and 3 ons. Next atography, |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, w | 3 ionuclides. exercises. urces and 3 ons. Next atography, idely used |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelation theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect agents, and practical examples. The whole lecture is oriented to utilization of these methods in Nuclear Chemistry 2 | KZ on at work with radiorevious laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wiffic requirements in | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelation theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification asp | KZ on at work with radiorevious laboratory open radioactive so ZK speciation calculatives, extraction chroms of the methods, wific requirements in ZK and description of the | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange | KZ on at work with radiorevious laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wiffic requirements in ZK and description of the resins including actions. | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelation theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification asp | KZ on at work with radiorevious laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wiffic requirements in ZK and description of the resins including actions. | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochroned in the semantic processes in the semantic processes, thermochroned in the semantic processes in the semantic processes, thermochroned in the semantic processes in the semantic processes in the semantic pr | KZ on at work with radiorevious laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wiffic requirements in ZK and description of the resins including actions. | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizations apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spectors agents, and practical examples. The whole lecture is oriented to utilization of these methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochromatography are discussed in more details | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculatives, extraction chromes of the methods, wific requirements in ZK and description of the resins including acommutography, distillar | 3 sinouclides. exercises. urces and 3 sons. Next latography, idely used the field. 2 ne ion-pair excesories tion and 2 |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelating theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochromatography are discussed followed with quality assurance of analysis and their relation. The attenti | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, expeciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the presins including acommutography, distillar amatography, distillar ZK ampling and pre-treated so for environments. | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples |
| Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelating theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrogeness and their relation of Radionuclides in the environment and their abundance. Sample types, se samples are discussed followed with quality assurance of analysis and their relation. The attention is also paid to individua | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, expeciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the presins including acommutography, distillar amatography, distillar ZK ampling and pre-treated so for environments. | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizations such as a reincluding extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrometectore membranes are discussed followed with quality assurance of analysis and their relation. The attention is also paid to individual instrumental separation methods are general spectrometry and gross alpha and beta activities measurement. Finally, the methods for determination of the selected radionuclide plutonium, 210Po, 210Pb, 226Ra, 222Rn, 3H, 14 | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculatives, extraction chromes of the methods, wific requirements in ZK and description of the resins including acomatography, distillar ZK ampling and pre-treads for environmentates (isotopes of uran | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizat Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification formation extraction systéme, extraction with mixtures of agents, and accessories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochroelectrochemical methods. 15SRZP Determination of Radionuclides in Environment The introduction of the lecture consit of the list of the important and monitored radionuclides in the environment and their abundance. Sample t | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, with a second control of the methods, with a second description of the resins including action and description of the resins including action of the resins including a second control of the resins including action of the resins including action of the resins including action of the residual of the resid | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizations such as a reincluding extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spect 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrometectore membranes are discussed followed with quality assurance of analysis and their relation. The attention is also paid to individual instrumental separation methods are general spectrometry and gross alpha and beta activities measurement. Finally, the methods for determination of the selected radionuclide plutonium, 210Po, 210Pb, 226Ra, 222Rn, 3H, 14 | on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wiffic requirements in ZK and description of the resins including action and presented for environmental ses (isotopes of uran Z,ZK Special techniques | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizations apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrogenical methods. 15SRZP Determination of Radionuclides in Environment The introduction of the lecture consit of the list of the important and monitored radionuclides in the environment and their abundance. Sample types, samples are discussed followed with quality assurance of analysis and their relation | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, with a continuous soften methods, with a continuous soften methods and description of the resins including a continuous soften methods, with a continuous soften methods, with a continuous soften methods for environmentations of the meth | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizations supply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrogenetical methods. 15SRZP Determination of Radionuclides in Environment The introduction of the lecture consit of the list of the important and monitored radionuclides in the environment and their abundance. Sample types, sa samples are discussed followed with quality assurance of analysis and their | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including an amatography, distillations of the resins including an amatography, distillations of the resins including an amatography of the resins including and pre-tree does for environmentates (isotopes of uran Z,ZK Special techniques rinciples. Mass special techniques | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, |
| Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification and formation extraction systéme, extraction with mixtures of agents, and accessories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochroelectrochemical methods. 15SRZP Determination of Radionuclides in Environment The introduction of the lecture consist of the list of the important and monitored radionuclides in the environment and their abundance. | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including a community of t | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, 3 rogeneous |
| Seminar 2 Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizations apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelat theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accessories and devices used in solvent extraction. Separation with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrocal electrochemical methods. 15SRZP Determination of Radionuclides in Environment The introduction of the lecture consist of the list of the important and monitored radionuclides in the environment and their abundance. | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including a community of t | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, 3 rogeneous containing |
| Get acquainted with radiochemical and radiation problems. 15SEPM Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelate theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification and formation extraction systéme, extraction with mixtures of agents, and accessories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochroelectrochemical methods. 15SRZP Determination of Radionuclides in Environment The introduction of the lecture consist of the list of the important and monitored radionuclides in the environment and their abundance. | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including a community of t | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, 3 rogeneous containing |
| Seminar 2 Get acquainted with radiochemical and radiation problems. | KZ on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including a community of t | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, 3 rogeneous containing |
| Get acquainted with radiochemical and radiation problems. Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilization students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in practices are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquid-liquid extraction, extraction of chelatic theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Nuclear Chemistry 2 The lecture is based and envolves Separation Methods in Radiochemistry I. Additional aspects of extraction separation methods such as classification of formation extraction systéme, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrogical examples are discussed of lowed with quality assurance of analysis and their relation. The attention is also paid to individual instrumental separation methods of molecular spectroscopy, fundamental principles. Finger print and pr | on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including and pre-tree obstantial obstanti | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, 3 rogeneous containing osition of |
| Seminar 2 Get acquainted with radiochemical and radiation problems. | on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including and pre-tree obstantial of the extraction chromes of the resins including and pre-tree obstantial of the extraction of the ex | 3 ionuclides. exercises. urces and 3 ons. Next latography, idely used the field. 2 ne ion-pair ccesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, 3 rogeneous containing osition of 1 rs. The first ace groups |
| Get acquainted with radiochemical and radiation problems. Practical Exercises in Separation Methods This advanced exercise consists of set of practical tasks aiming to show fundamental radiochemical separation methods, their modifications and utilizati Students apply knowledge received in lectures Separation methods in Nuclear Chemistry 1 and Nuclear Chemistry and are also using skill acquired in Tasks are including extraction, chromatographic, coprecipitation procedures and principles, in which good work management and proper handling with nuclear waste is necessary. Various types of radionuclides, single or in genetic relationship are used. 15SMJ1 Separation Methods in Nuclear Chemistry 1 This lecture consists of several chapters, at the beginning the chemistry of complex compounds, its generation and stability is discussed followed with chapter gives a general overview of the separation methods and their comparison. Further, the fundamentals of liquicil-liquid extraction, extraction of chelatit theory of ion exchange together with ion-exchange chromatography, and other chromatographic methods are discussed, all including theoretical aspect agents, and practical examples. The whole lecture is oriented to utilization of these methods in nuclear and radiochemistry, their advantages and spec 15SMJ2 Separation Methods in Radiochemistry 1. Additional aspects of extraction separation methods such as classification of formation extraction système, extraction with mixtures of agents, and accesories and devices used in solvent extraction. Separations with ion-exchange and high performance liquid chromatography are discussed in more details. Finally, the lecture includes membrane separation processes, thermochrogenetic methods. 15SRZP Determination of Radionuclides in Environment The introduction of the lecture consit of the list of the important and monitored radionuclides in Environment The introduction of the lecture consit of the list of the important and monitored radionuclides in Environment SISRZP Determina | on at work with radio previous laboratory open radioactive so ZK speciation calculations, extraction chromes of the methods, wific requirements in ZK and description of the resins including a community of the resins including a community of the resins including a community of the resins including and pre-tree ods for environmental escriptions of uran Z,ZK special techniques or inciples. Mass special techniques or inciples or incip | 3 ionuclides. exercises. urces and 3 ons. Next atography, idely used the field. 2 ne ion-pair ocesories tion and 2 atment of al samples nium and 3 2D NMR, ctrometry, 3 rogeneous containing osition of 1 rs. The first ace groups xplained, |

| | rs, and Hull-Davey nomograms. The last part covers applications of diffraction methods including phase identification, quantitative ana -chemical properties using diffraction methods, measurements under non-standard conditions and also the principles of electron and | | |
|--|---|---------------------------------------|---------------|
| 15TPC | | ZK | 2 |
| | Technology of Fuel Cycles of Nuclear Power Stations | l l | |
| - | pes of uranium ores and their classification, and physical and radiometric ore dressing methods are specified. The main attention is paid | | _ |
| - | ns of which the products of technical grade and then of nuclear grade, as metallic U, UO2, UN, UC and UF6, are obtained. In this dom | | |
| - | reparations are implicated. The manufacturing of fuel elements, based on metallic uranium, on tablets of UO2 or MOX fuel (UO2+PuO2 | • | |
| types of | nuclear reactors (LWR, FBR and HTGR) is described. The principles of spent fuel reprocessing and of radioactive wastes treatment | are mentioned, too |). |
| 15TRF | Radiopharmaceuticals Technology | ZK | 2 |
| 1.Research and d | evelopment of radiopharmaceuticals, preclinical and clinial studies. 2.Raw materials and precursors of radiopharmaceuticals. 3.Speci | icity of radiopharm | naceuticals |
| preparation and p | production. 4.Sources of radionuclides, target systems and apparatuses (gaseous, liquid, solid), natural and enriched materials, their r | ecycling. 5.Manipu | lation with |
| | ogical shielding. Automated synthesisers (dedicated/universal, separation modules, microfluidic systems, proces parameters sensors, | | |
| | ensing, formulation, sterilization and marking. 7. Pharmacopoeia and proces quality control methods of radiopharmaceuticals. 8. Processe | • | |
| | ent systems, documentation. 9.Logistics of radiopharmaceuticals production. 10.Legislation requirements for radiopharmaceuticals production. | | |
| 15TZOA | Waste Management and Treatment | ZK | |
| | | | 3 |
| 15TZRCH | Theoretical Foundations of Radiation Chemistry | ZK | 2 |
| | otion of an interaction of ionizing radiation with matter. Theory of primary processes in radiation chemistry: excitation and ionization. R | | _ |
| | er in molecular systems. Inelastic electron scattering. Primary radiation chemical yields. Formation, structure and properties of solvate chemical kinetics. Theory of an action of ionizing radiation in solids (electron-phonon interaction; radiation defects in crystals) and ga radiation chemical reactivity. | | - |
| 15UFCB | Introduction to Photochemistry and Photobiology | ZK | 2 |
| reactions are defi | n absorption of UV/vis radiation in molecular system and the energy transfer is explained and discussed. Then, photochemical laws and quence. Experimental techniques in photochemistry are reviewed. The light is also shed on the relationship between photochemistry and | antum yields of phoradiation chemistr | y / plasma |
| - | s and nature of different photochemical reactions are described in general. Within a part of the course devoted to the systematic phot | | |
| ` | ganic, coordination, organometallic, organic and bio-organic compounds are reviewed. Practical utilization of photochemical reactions | ** | 0 |
| photolithography, p | photochemical syntheses, environmental photochemistry, etc.). Fundamentals of biological action of UV/vis radiation are exposed in the paid to photosynthesis, vision, and photodynamic therapy. | ne course. Special | attention is |
| 15VJZ | Decomissioning of Nuclear Facilities | ZK | 2 |
| 1. History, situatio | n, long-term operation. 2. Strategy of decomissioning. 3. Stages of decomissioning. 4. Legislation 5. Costs 6. Treatment of the waste: | ı | ventory of |
| 7, | radionuclides, storage and storage | , | , , , |
| 4E\/LICH4 | <u> </u> | 7 | 6 |
| 15VUCH1 | Research Project 1 | Z | 6 |
| | Thesis for internal defence. | | |
| 15VUCH2 | Research Project 2 | KZ | 8 |
| | Thesis for internal defence. | | |
| 15ZFRM | General Pharmacology | ZK | 2 |
| _ | with use of organic compounds in human pharmacotherapy. The relation between chemical constitution and biological activity is discu- | l l | |
| | al pharmacology (distribution in organisms, kinetic parameters, biotransformation, dose response etc.) are explained. The second one | · · · · · · · · · · · · · · · · · · · | |
| - | utically useful substances. The definition and explanation of common pharmacotherapeutical terms and a survey of pharmaceutics in also involved. | • | _ |
| 15ZOCH | Protection of Environment | ZK | 2 |
| | l I | l l | |
| • | es basic information about detrimental pollutants, about their impact on flora and fauna including man. It presents overview on the envicentrol the concentrations and pollutant migration, determining the limits and environmental legislation. The migration of pollutants in ways of the environment protection and pollution prevention will be discussed. | • | |
| 16BAF | Biochemistry and Pharmacology | ZK | 2 |
| | plochemistry and r narmacology of organic chemistry, biochemistry and pathology of body fluids, biochemistry of breathing, biochemistry of digestion and resorption, k | | |
| significance of liver | , metabolism of water and minerals, metabolism of trace elements, nutrition. Basic principles of pharmacology - biotransformation of pharmacodynamics, classification of pharmaceuticals, chemotherapeutics, radiopharmaceuticals and diagnostic preparation and for their fabrication. | rmaceuticals, their | absorption, |
| 16MCDE | Monte Carlo Method in Radiation Physics | 7 7K | 4 |
| 16MCRF | ı | Z,ZK | |
| | the MC method, probability theory and selected concepts in mathematical statistics. Ionising radiation transport simulation, photons, n | • | |
| | their simulation, modelling of the geometric conditions. Statistical tests of the model calculations, variance reduction techniques. Code | | |
| | (X) code, properties and scope of usage, input file (description of the geometry, materials, sources, tallies), graphical tools, code user | | = |
| _ | isualization (VISED, Sabrina, Body Builder). Examples of application (practical training) concentrated on radiation physics (shielding, ra | | |
| spectral/spatial dis | stributions of the dosimetric quantities, responses of detection systems, radiation protection tasks. The basics of working with the pro | gram Fluka and Ge | eant, SRIM |
| | code for simulation of the transport of charged particles. | | |
| 16RAO | Radiation Protection | ZK | 4 |
| | ect is to provide a self-contained overview of the radiation protection with a special focus on general principles. The subject is based on the | | |
| - | documents, which specifies radiation protection in the Czech Republic and EU. The course is accepted as training, which allows obtained by the course is accepted as training, which allows obtained by the course is accepted as training, which allows obtained by the course is accepted as training, which allows obtained by the course is accepted as training. | | |
| Jo and ouler | radiation protection. Participants will receive an appropriate certificate of attendance when fulfil all requirements defined in the permi | | - 3.3.100 111 |
| 400010 | | | |
| 16RBIO | Radiobiology | ZK | 2 |
| - | ures are aimed at basis of radiation biology. Students are introduced into biological effects of ionizing radiation; physical and chemica | • | |
| in biological mat | erial; mechanisms of radiation damage to DNA and other cell components; types of damages and their repair; subcellular and cellulaı | sensitivity and res | sponse to |
| the second section is a few and a second | | narmal and nasal | antia tinaua |
| irradiation; physica | ıl, biological and chemical modificators of the cell response to irradiation; theories and models for cell survival and radiation biology of | normai and neopi | asiic lissue |

For updated information see http://bilakniha.cvut.cz/en/FF.html Generated: day 2025-06-15, time 23:26.