Study plan

Name of study plan: Jaderné inženýrství - Jaderné reaktory

Faculty/Institute/Others: Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Nuclear Engineering Type of study: Follow-up master full-time Required credits: 0 Elective courses credits: 120 Sum of credits in the plan: 120 Note on the plan:

Name of the block: Compulsory courses in the specialization Minimal number of credits of the block: 0 The role of the block: PS

Code of the group: NMSPJIJR1 Name of the group: MDP P_JIN JR 1st year Requirement credits in the group: Requirement courses in the group: In this group you have to complete at least 10 courses 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
17ERF	Experimental Reactor Physics Jan Rataj Jan Rataj (Gar.)	KZ	4	4	L	PS
17FARE	Nuclear Reactor Physics Jan Frýbort, Lenka Frýbortová Jan Frýbort (Gar.)	Z,ZK	4	2P+2C	Z	PS
17JABE	Nuclear Safety Lenka Frýbortová, ubomír Sklenka Lenka Frýbortová (Gar.)	ZK	5	4P	Z	PS
17KID	Reactor Kinetics and Dynamics Ond ej Huml Ond ej Huml (Gar.)	Z,ZK	4	2P+2C	L	PS
02KFM	Quantum Physics Filip Petrásek Petr Jizba Filip Petrásek (Gar.)	Z,ZK	3	2P+1C	Z	PS
17PENF	Advanced Experimental Neutron Physics Ond ej Huml Ond ej Huml (Gar.)	KZ	4	1P+3L	L	PS
17PRF	Core Physics and Fuel Management ubomír Sklenka ubomír Sklenka (Gar.)	Z,ZK	3	2+0	L	PS
17THYR	Thermohydraulics of Nuclear Reactors Dušan Kobylka Dušan Kobylka (Gar.)	Z,ZK	4	3P+1C	L	PS
16VUJI1	Research Project 1 Tomáš Bílý Tomáš Trojek (Gar.)	Z	6	0+6	1	PS
16VUJI2	Research Project 2 Tomáš Trojek, Tomáš Bílý Tomáš Bílý Tomáš Trojek (Gar.)	KZ	8	0+8	2	PS

Characteristics of the courses of this group of Study Plan: Code=NMSPJIJR1 Name=MDP P_JIN JR 1st year

17ERF Experimental Reactor Physics ΚZ 4 The lectures are focused on experimental methods used for determination of neutron-physical and basic operational parameters of on nuclear reactors. The lectures deal with research nuclear reactors, their classification and utilisation in the field of experimental reactor physics, experimental methods focused on reactivity measurement, determination of control rod characteristics in the nuclear reactor, dynamics study of nuclear reactor, realisation of the critical experiment. Within the last lectures is prepared basic critical experiment at VR-1 reactor. The lectures are supplemented with experimental practices at the training reactor VR-1: reactivity measurement, control rod calibration, dynamics study of nuclear reactor, prediction of unknown critical state. The main part of practices is focused on realization of basic critical experiment at VR-1 reactor. 17FARE Nuclear Reactor Physics Z.ZK 4 The subject Nuclear reactor physics builds on previously gained knowledge from fundamentals of reactor physics, kinetics, dynamics, thermohydraulics, and thermomechanics. The lectures start with transport theory introduction, trans-port equation formulation, and its utilization in reactor physics. The transport theory requires broad range of nuclear data. The students will learn how continuous and group-wise nuclear data are prepared and how the self-shielding effect is respected in heterogeneous reactors. A special chapter is utilization of perturbation theory. The importance of the adjoint flux for uncertainty and sensitivity calculations in reactor physics will be explained. The final part of lectures is devoted to coupled calculations of neutronics, termohydraulics, and thermomachanics in nuclear reactors.

17JABE	Nuclear Safety	ZK	5			
The course gives inform	ation about basic requirements for safety assessment of nuclear facilities. New knowledge is connected with information get	from other course	s focussed on			
reactor physics, reactor	thermomechanics and dynamics. During lectures are discussed principles of defence in depth, deterministic and probabilisti	c safety assessme	ent, accidents			
with loss of coolant, and accidents with positive reactivity and criticality. Next part of the course follows up use of operation experiences and lessons learned from important events.						
The last part is focussed	d on safety aspect of operation of different types of reactors and their comparison to PWR and safety aspects of operation of	research reactors	s.			
17KID	Reactor Kinetics and Dynamics	Z,ZK	4			
Reactor kinetics, delaye	d neutrons, mean neutron lifetime, asymptotic period. Zero-power reactor dynamics - Formulation of short-term kinetics equat	ions, delayed neu	iron parameters,			
simplified solutions. Zero	p-power reactor transfer function. Reactivity coefficients for different reactor configurations, temperature coefficients, tempera	ature feedback, re	actor stability,			
linear and nonlinear kine	etics. Heat transfer in reactors, reactor dynamics. Mathematical model of power reactor with temperature feedback, simplified	I models of reacto	r dynamics,			
computer models of rea	ctor dynamics.					
02KFM	Quantum Physics	Z,ZK	3			
State description, wave	function, postulates of quantum mechanics, Born's statistical interpretation, expectation values, Schrödinger equation, Heise	enberg uncertaint	y principle,			
quantization of angular	momentum, solution of simple systems, hydrogen atom.					
17PENF	Advanced Experimental Neutron Physics	KZ	4			
Practical exercises with	non-reactor neutron sources, neutron detection, determination of basic properties of radionuclide neutron sources (AmBe, C	f252), neutron spe	ectrometry using			
Boner spheres and scint	illation detectors, neutron beam attenuation by various materials, acceleration based neutron sources (D-D, D-T generators), p	roperties of photo	neutron sources,			
neutron dosimetry, neut	ron activation analysis, and more.					
17PRF	Core Physics and Fuel Management	Z,ZK	3			
The course is focused o	n inner nuclear fuel cycle of the nuclear power plants, particularly PWR used and / or planned in the Czech Republic. The fir	st part of the cour	se consists of			
introduction to the core	physics, e.g. fuel changes during the cycle, burn-up, changes of keff during the cycle, xenon poisonings and xenon oscillation	ns, samarium, etc	. The second			
part of the course consi	sts of NPP fuel cycle, fuel burn-up and fuel management, e.g. fuel handling, fuel management, reactor operation, burn-up, fu	el loading, fuel re	loading, loading			
pattern, legislative requi	rements for the core, core loading and fuel handling, fuel cycle of WWERs PWR, Fuel cycle of Dukovany & amp; Temelín NP	P, fuel cycle of we	stern PWRs,			
	J fuel cycle. At the end of the course basic information about MOX fuel is mentioned. Note: Front-end & amp; back-end of the	nuclear fuel cycle	of the nuclear			
power plants is the part	of 17JPC - Nuclear fuel cycle course					
17THYR	Thermohydraulics of Nuclear Reactors	Z,ZK	4			
The course extend stude	ent's basic knowledge in the field of thermohydraulics of nuclear reactors, which they obtain in their previous study. Students	are familiarized w	ith 2 phase flow,			
	her with forced convection and boiling crisis analyses in the nuclear core conditions. The temperature distribution in the coola					
-	bhydraulic of the full nuclear reactor core, including the hot channel theory. The parts of the course are also lectures about co					
• • • • •	rbulent flow and its modelling. Explication is focused on understanding and application of knowledge for basic thermohydraul	e				
	ws todays limits of knowledge. One lecture is focused on special convection to uncommon coolants, which can be applied for	r example in gen.	IV nuclear			
reactors.						
16VUJI1	Research Project 1	Z	6			
	based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the	project supervisor	during common			
regular meetings and di	scussions.					
16VUJI2	Research Project 2	KZ	8			
The research project is t	based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the	project supervisor	during common			
regular meetings and discussions.						
Code of the ar	oup: NMSPJIJR2					

Name of the group: MDP P_JIN JR 2nd year Requirement credits in the group: Requirement courses in the group: In this group you have to complete at least 8 courses

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
16APIZ1	Applications of Ionizing Radiation 1 Tomáš Trojek, Václav Procházka, Tomáš echák Tomáš Trojek Tomáš echák (Gar.)	ZK	3	3P+0C	L	PS
17APIZ2	Application of Ionizing Radiation 2 Martin Cesnek, Marcel Miglierini, Milan Štefánik	Z,ZK	3	2P+1L	L	PS
16DPJI1	Master Thesis 1 Jan Frýbort Tomáš Trojek (Gar.)	Z	10	0+10	3	PS
16DPJI2	Master Thesis 2 Jan Frýbort Tomáš Trojek (Gar.)	Z	20	0+20	4	PS
16MEIZ	Metrology of Ionizing Radiation Pavel Novotný Pavel Novotný Tomáš Trojek (Gar.)	Z,ZK	4	2+1	Z	PS
17NJZ	New Nuclear Sources Tomáš Bílý Tomáš Bílý Tomáš Bílý (Gar.)	ZK	3	3+0	Z	PS
17PAJE	Intership in Nuclear Power Plant Martin Kropík, Sebastian Nývlt Martin Kropík (Gar.)	Z	2	1XT	Z	PS
17TERP	Thermomechanics of Nuclear Fuels Martin Ševe ek, Adam Kecek Martin Ševe ek (Gar.)	Z,ZK	4	2P+2C	Z	PS

Characteristics of the courses of this group of Study Plan: Code=NMSPJIJR2 Name=MDP P_JIN JR 2nd year

16APIZ1	Applications of Ionizing Radiation 1	ZK	3		
Applications of ionizing radiation 1 inclusive of radioanalytical methods and application of radionuclides and ionizing radiation for analysis and diagnostics of industrial and research					
processes.					

17APIZ2 Ap	plication of Ionizing Radiation 2			Z	Z,ZK	3
	w of possibilities of the applications of ionizing radiation namely in the field of character	eriza-tion and diag	nostic of ma	aterials for t	he sake of scie	ence and
technology. Emphasis will be	e given to advanced methods of materials characterization which utilize atomic and nu	clear physical pro	cesses. Sev	eral diagnos	stic methods b	ased upon
ionizing radiation will be intro	oduced.					
16DPJI1 Ma	aster Thesis 1				Z	10
The diploma project is based	on a topic approved by the administrators of the programme, department and by the d	ean. The student i	s guided by	the project	supervisor dur	ing common
regular meetings and discuss						
16DPJI2 Ma	aster Thesis 2				Z	20
	I on a topic approved by the administrators of the programme, department and by the d	lean. The student i	s guided by	the project	supervisor dur	-
regular meetings and discuss	sions.					
16MEIZ Me	etrology of Ionizing Radiation			7	Z,ZK	4
	nts to the metrology, including its legislative framework. Fundamental and general conc	epts of the field (c	alibration. ve			-
	dards, measurement accuracy) are explained. Further, the methods of atomic and nuc	-				-
-	d dose) are discussed in detail.			,		,
17NJZ Ne	w Nuclear Sources				ZK	3
	clear power systems. Students get familiar with reactor designs for near term future as v	vell as with design	es under co	1		-
	tor systems of generation III+, gen. IV., accelerator driven systems, fusion systems, the	-				-
outlook.		•				
17PAJE Inte	ership in Nuclear Power Plant				Z	2
	b get a deeper knowledge of systems and the operation of a nuclear power plant. The pl	ractice is organize	d on the nuc	lear power	- 1	_
	all important parts of a nuclear power plant during an extended excursion and get a ba	-		-	-	-
training center and a simulate						
17TERP The	ermomechanics of Nuclear Fuels			7	Z,ZK	4
	chanics of Nuclear Fuels introduces the fundamentals of fuel thermomechnics and fue	el per-formance. T	he introduct			o various
	an emphasis on light water reactors. The key parts of nuclear fuel cycle are reminded			-		
-	ets over pellet-cladding gap to cladding and design of the assembly. Physical models r		-	-		
fuels are presented including	g the effects related to the fuel burnup. After the introduction of particular models, inter	links and feedbac	ks are prese	ented includ	ling the limitati	ons on fuel
design and nuclear safety. Th	ne design and construction of fuel assemblies is presented at the end with calcula-tions	of their mechanic	al design. T	he theory w	vill be further a	oplied during
exercises by using thermome	echanical codes such as FRAPCON and FRAPTRAN.					
Name of the bloc	k: Compulsory elective courses					
	of credits of the block: 0					
The role of the blo	ock: PV					
Code of the group	p: NMSPJIJRPV11					
Name of the grou	ip: MDP P_JIN JR Required optional courses 1st g	proup 1st v	rear			
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Requirement crea						
Requirement cou	rses in the group: In this group you have to comple	ete at least	t 2 coui	ses		
Credits in the gro	un: 0					
-	•	a ži O ja ža dra ž	4 . <i>i</i>			
Note on the group		on z predme	ty.			
	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their	Completion	Credits	Scope	Semester	Role
	members)		Siculto	20049	Somoster	
	Tutors, authors and guarantors (gar.)					
17DERF	Deterministic Methods in Reactor Physics	КZ	4	2+2		PV
	Jan Frýbort, Pavel Suk Jan Frýbort Jan Frýbort (Gar.)		· ·		ļ	. .
17NAA	Neutron Activation Analysis	KZ	4	2P+2L	L	PV
	Milan Štefánik Milan Stefánik (Gar.)					

Nuclear Research Installations ubomír Sklenka, Jana Matoušková ubomír Sklenka (Gar.) Characteristics of the courses of this group of Study Plan: Code=NMSPJIJRPV11 Name=MDP P_JIN JR Required optional courses 1st group 1st year

ΚZ

ΖK

4

4

2+2

2P+2C

Ζ

Ζ

P٧

ΡV

Stochastic Methods in Reactor Physics Ond ej Huml Ond ej Huml (Gar.)

17SMRF

17VYRE

group ist year						
17DERF	Deterministic Methods in Reactor Physics	KZ	4			
Course is intended to nuclear data processing for mathematical modeling in nuclear reactor physics, to analytical and numerical solution of various deterministic methods in reactor						
systems, statistic metho	ds in nuclear reactor physics and to nuclear reactor burn-up modeling. Stress is put on practical examples, exercises and inc	lividual students?	work on solving			
given exercises. After pa	assing the course the attendees obtain not only theoretical knowledge, but also practical experience with various methods an	d approaches to	modeling of			
neutron-physical charac	teristics of nuclear facilities and their application on real reactor systems.					
17NAA	Neutron Activation Analysis	KZ	4			
The aim of the course is	to make students familiar with the topics of radioanalytical method of neutron activation analy-sis and activation measurement	nts. Students will	acquire detailed			
knowledge on neutron-ir	nduced nuclear reactions, neu-tron sources, neutron spectra, nuclear data and tools useful for activation techniques. They will g	et detail knowledg	e on procedures			
of neutron activation and	Ilysis, individual methods and types of activation analysis, and wide applications of this radioanalytical method in physical scie	nces and humanit	ies. The working			
procedures of neutron a	ctivation analysis, its utilization for neutron field spectrometry, measurement of cross-sections and fission yields, and nuclear	data valida-tion v	will be described			
in detail. Students will ro	utinely work with semiconductor gamma spectrometers, they extend previously acquired knowledge on gamma spectrometr	y. They will perfor	m activation			
measurements and composition analysis of various types of samples (historical, geological, environmental, biological) and neutron field parameters measurement necessary for						
determination of absolute thermal neutron flux and neutron spectrum. Students will acquire a wide practical experience with HPGe detectors, experimental work at the Training reactor						
VR-1, and neutron activ	ation analysis in an interdisciplinary approach.					

17SMRF	Stochastic Methods in Reactor Physics	ΚZ	4
	uclear data processing for mathematical modeling in nuclear reactor physics, to analytical and numerical solution of various of		nods in reactor
	ods in nuclear reactor physics and to nuclear reactor burn-up modeling. Stress is put on practical examples, exercises and inc		•
	r passing the course, the attendees obtain not only theoretical knowledge, but also practical experience with various methods	and approaches	to modeling of
neutron-physical charac	cteristics of nuclear facilities and their application in real reactor systems.		
17VYRE	Nuclear Research Installations	ZK	4
The course is focused of	on technology, operation and utilisation of nuclear research installations (research reactors) and its particular features compar	ing to nuclear pov	ver plants. At the
beginning of the course	history and classification of re-search reactors are discussed. The second part is focused on research reactor operation, sal	ety, management	as well as to
	ch reactor, construction and commissioning of research reactor. The third part of the course deal with research reactors utilis		
	roduction, neutron imaging, silicon doping etc. The last part of lectures is dedicated to research reactor technology and examp		
	m and high power research reactors which are in operation worldwide. The course also consists of hands-on laboratories at t	•	
0	application of the theory presented during the lectures. Part of the laboratories is hands-on training of the VR-1 reactor opera	tion when student	ts are learning
how to operate the read	tor.		
Code of the gr	oup: NMSPJIJRPV21		

Name of the group: NMS P_JIN JR Required optional courses 2nd group 1st year Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 1 course Credits in the group: 0

Note on the group:

Student si volí alespoň 1 předmět.

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
17SPEK	Gamma-ray Spectroscopy Milan Štefánik Milan Štefánik (Gar.)	КZ	4	2P+2L	Z	PV
14NMR	Materials Science for Reactors Petr Haušild Petr Haušild (Gar.)	ZK	2	1P+1C	6	PV
14NAMA	Materials Science Petr Haušild Petr Haušild (Gar.)	KZ	3	2P+1C		PV
15PCJE	Chemistry Programme of Nuclear Power Plants Barbora Drtinová Barbora Drtinová Barbora Drtinová (Gar.)	Z,ZK	3	3P	L	PV

Characteristics of the courses of this group of Study Plan: Code=NMSPJIJRPV21 Name=NMS P_JIN JR Required optional courses 2nd group 1st year

17SPEK	Gamma-ray Spectroscopy	KZ	4			
The aim of the course is to get students familiar with the topics of nuclear gamma spectrometry. Students will acquire detailed knowledge on the nature of gamma radiation, its interaction						
with matter and accomp	panying effects, the effects of detector response, detector characteristics and nuclear data, and tools useful for gamma spect	roscopy. In the pra	actical part of the			
course, students will be	made familiar with the gamma-ray measurements and gamma spectrometers, especially with precise semiconductor detect	ors, principles of a	alibration and			
operation of gamma-ray	/ spectrometer, and with character and effects affecting the gamma-ray spectrum creation. They will get the practical experies	nce with HPGe de	tectors and			
experimental activities a	at the Training reactor VR-1, and focused on application in nuclear analytical methods and neutron activation analysis.					
14NMR	Materials Science for Reactors	ZK	2			
Materials for classical a	nd fusion reactors					
14NAMA	Materials Science	KZ	3			
Introduction to the Mate	rials Science.					
15PCJE	Chemistry Programme of Nuclear Power Plants	Z,ZK	3			
The course deals with t	The course deals with the principles of water technology and chemistry of nuclear power plants (NPP). 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 for the treatment of						
wastes and the corrosion problems of the construction materials are discussed in detail, too. Students will be able to evaluate and to assess the effect of technological parameters on						
the processes of water	treatment and decontamination.					

Code of the group: NMSPJIJR12

Name of the group: MDP P_JIN JR Required optional courses 1st group 2nd year Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 2 courses Credits in the group: 0

Note on the group:

Student si volí alespoň 2 předměty.

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
17BAJZ	Safety Analyses of Nuclear Installations Lenka Frýbortová, Filip Fejt Filip Fejt (Gar.)	KZ	4	2P+2C	Z	PV
17THAR	Thermohydraulic Design of Nuclear Reactors Dušan Kobylka Dušan Kobylka (Gar.)	ZK	4	2P+2C	Z	PV
17TNAP	Thermomechanical Design of Nuclear Fuels Martin Ševe ek, Adam Kecek Martin Ševe ek (Gar.)	KZ	4	2P+2C	L	PV

17HAV Accidents of Nuclear Installations Jan Frýbort, Sebastian Nývlt, Filip Feit, Adolf Rýdl Filip Feit (Gar.)	4	2P+2C	L	PV
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Characteristics of the courses of this group of Study Plan: Code=NMSPJIJR12 Name=MDP P_JIN JR Required optional courses 1st group 2nd year Safety Analyses of Nuclear Installations 1/7

17BAJZ Safety Analyses of Nuclear Installations	KZ	4			
The scope of this lecture is focused on general content of safety analysis report of nuclear installation, purpose of safety analysis and its preparation a	ccording to Czech	legal framework			
and international recommendations. Model example is represented by reactor VR-1 and its safety analysis report that will be introduced to students during lectures. Special interest is					
put on design basis characteristics, i.e. its description and evidence of fulfilment for geodynamics, geotechnics, seismicity and transport paths of radionuclide. In addition, students will					
get familiar with topic of design-basis incidents and following design extensions for reactor VR-1. Students will be acquainted with common calculation	on codes for safet	y analyses and			
they will also gain hands-on experience with model problems.					
17THAR Thermohydraulic Design of Nuclear Reactors	ZK	4			
The course extends theoretical knowledge from the course Thermohydraulics of nuclear reactors and different thermohydraulics courses and shows	its practical appli	cation for design			
of nuclear reactors. Students come to know more about flow and heat transfer in the fuel bundles and different methods of thermohydraulic design of re	actor core. In deta	ils are explained			
CFD solution, subchannel analysis and use of system codes for these purposes. Coupling of the mentioned methods and coupling with different calcula	tions are explaine	d too. Theoretical			
lectures are completed with exercises during which students practice theory on practical tasks which are solved by SW codes: CFD ANSYS group, /	ALTHAMC12, CO	BRA SFS and			
RELAP.					
17TNAP Thermomechanical Design of Nuclear Fuels	KZ	4			
The course title thermomechanical design of nuclear fuels directly follows the course 17TMECH. The fundamental knowledge introduced in the 17TMI	ECH course are fu	urther elaborated			
towards particular subchapters of the safety reports of light water reactors (Chapter - Reactor) and design of nuclear fuels including advanced conce	epts. All of the cor	nponents and			
their construction of nuclear fuel system are introduced (fuels, cladding, assemblies, control assemblies) together with their links to fundamental safe	ety and operation	al functions of			
nuclear reactors. The safety/operational/limiting criteria used by US NRC and OECD/NEA will be discussed together with their origin and implication	s to nuclear react	or construction.			
Standard operational modes as well as transport, storage or disposal of nuclear fuels are included. These limitations will be practically studied by sir	nulation codes Bi	son and FAST.			
New fuel designs and advanced fuel concepts will be presented at the end including Lightbridge fuel, double-cooled fuels, accident tolerant fuels tog	gether with curren	t trends towards			
increasing enrichment and burnups.					
17HAV Accidents of Nuclear Installations	KZ	4			
The scope of this lecture is focused on basic principles of management of severe accidents, specific requirements that are described in SAMG (Serie	bus accident man	agement guides)			
and EOP (Emergency operating procedures) based on definition of Czech legal framework. Students will enhance their knowledge of technologies and	d management str	ucture of nuclear			
power plant necessary to successfully manage a serious accident. In addition a theoretical background will be presented for basic phenomenology of	of serious acciden	its, including			
behaviour of fission products, source term, and introduction to physical and chemical basis of selected processes that are frequent in nuclear power	plant accidents.	Students will be			
acquainted with codes for accident analyses utilization and understanding of basic calculation aspects. Specific phenomena will be presented with the	help of actual acc	idents at nuclear			
power plants, namely TMI-2 and Fukushima.					

Code of the group: NMSPJIJR22

Name of the group: MDP P_JIM JR Required optional courses 2nd group 2nd year Requirement credits in the group: Requirement courses in the group: In this group you have to complete at least 1 course

Credits in the group: 0 Note on the group. Student si volí alespoň 1 předmět.

Note on the group		on i prounie				
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
17KEX	Critical Experiment Jan Rataj, Ond ej Huml Jan Rataj (Gar.)	KZ	4	1P+3L	Z	PV
17PERF	Advanced Experimental Reactor Physics Jan Rataj, Ond ej Huml Ond ej Huml (Gar.)	KZ	4	1P+3L	L	PV
17VRAO	Spent Nuclear Fuel and Radioactive Wastes Evžen Losa Evžen Losa (Gar.)	ZK	4	3P+1C	Z	PV

Characteristics of the courses of this group of Study Plan: Code=NMSPJIJR22 Name=MDP P_JIM JR Required optional courses 2nd group 2nd year

17KEX	Critical Experiment	KZ	4			
The course presents a semesterly project focusing on design and assembling a new core configuration of the VR-1 reactor. The lectures devote to the requirements for the core						
configuration of the VR-	configuration of the VR-1 reactor, methods and range of neutron-physical characteristics determination, legislative requirements for a critical experiment performed at the research					
	entation, procedure of the critical experiment. The lectures are complemented by practical exercises devoted to the design and		Ũ			
for critical experiment, d	etermination of neutron-physical characteristics, preparation of the experiment program and the training of manipulations pref	ormed during the	experiment. The			
	e course is devoted to the critical experiment during which the students build and experimentally verify new core configuratio					
the students will process	s experimental data obtained during the experiment, perform their evaluation and prepare a document presenting the results	of the experimen	t.			
17PERF	Advanced Experimental Reactor Physics	KZ	4			
The course is focused or	n advanced experimental methods used in determination of neutron-physical and operational parameters of nuclear reactors. A	Attention is paid m	ainly to methods			
focused on determination	n of microscopic theory parameters, determination of reactor power, measurement of reactivity in deep subcritical states, de	termination of rea	ctor kinetic			
parameters, determinati	on of reactor transfer function and study of Cherenkov radiation in nuclear reactor. Lec-tures devote to the theoretical basis f	or methods of me	asurement of			
microscopic theory para	meters, determination of reactor power at low or zero power reactors, application of noise analysis and pulsed neutron source	ce methods, meas	sure-ment of			
transfer function and de	tection of Cherenkov radiation in nuclear reactor. The lectures are complemented by the laboratory exercises at the VR-1 trai	ining reactor to sh	ow the students			
the practical application of the mentioned methods at the real nuclear facility.						
17VRAO	Spent Nuclear Fuel and Radioactive Wastes	ZK	4			
In frame of this subject, students are familiarized with sources of radioactive wastes, system of their classification and handling. Spent nuclear fuel and RAW handling is activity subjected						
to permission and is bound with national legal framework. Different strategies exist for the SNF and RAW handling which are country specific. Each strategy requires usage of unique						
technologies and processes in dependence on national law.						

Code of the group: NMSPJIJRV Name of the group: MDP P_JIN JR 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
17ALEP	Nuclear legislation in practice Dana Drábová Dana Drábová (Gar.)	KZ	2	2P	L	V
17CIBS	Digital Safety Systems of Nuclear Reactors Martin Kropík Martin Kropík Martin Kropík (Gar.)	Z,ZK	2	2+0	L	V
17EK	Economics of Nuclear Facilities Radovan Starý Radovan Starý (Gar.)	ZK	2	2+0	Z	V
17IMF	Computer Science for Modern Physicists Dušan Kobylka	KZ	3	0+3	Z	V
17KOJX	Design and Equipment of Nuclear Power Plants Jan Rataj, Dušan Kobylka, Pavel Zácha Jan Rataj (Gar.)	ZK	3	3P		V
17PALX	Nuclear Fuel Cycle ubomír Sklenka, Dušan Kobylka, Evžen Losa, Radovan Starý	ZK	2	2P	L	V
17ROJ	Radiation Protection of Nuclear Facilities Radovan Starý Radovan Starý (Gar.)	ZK	2	2+0	L	V
17SIPS	Simulation of NPP Operational States Dušan Kobylka Dušan Kobylka (Gar.)	KZ	3	0+3	Z	V
01SUP	Start-up Project P emysl Rubeš P emysl Rubeš (Gar.)	KZ	2	2P+0C		V
17TYPR	Team project Jan Frýbort Jan Frýbort (Gar.)	KZ	4	2P+2C	Z	V

Characteristics of the courses of this group of Study Plan: Code=NMSPJIJRV Name=MDP P_JIN JR Optional courses

17ALEP Nuclear legislation in practice	KZ	2				
The course is focused on examples of application of Czech nuclear legislation in practice, particularly in safe operation of nuclear power plants, reserved.	arch reactors and	l radioactive				
materials. The introductory lectures deal with legislative framework for peaceful use of nuclear energy in the Czech Republic; structure and responsibilities of national regulatory body;						
and relation of Czech nuclear legislation to international recommendations and international organisations (such as IAEA, EURATOM, WENRA). The	second part of the	ne course is				
dedicated to case studies of application of Czech nuclear legislative in practice. Case studies reflect real legislative practices and current situation in	safe operation of	nuclear power				
plants, research reactors and radioactive materials. Case studies are particularly focused on sitting and construction of nuclear installations; commissioning	g, operation and d	lecommissioning				
of nuclear installations; operation of sites with radioactive sources and radioactive materials; categorisation of radiation laboratories (class III or IV), h	nandling with nucl	ear materials				
such as import and export; transport of radioactive and nuclear materials; etc. The course is organised in collaboration with experts from Czech natio	nal regulatory bo	dy.				
17CIBS Digital Safety Systems of Nuclear Reactors	Z,ZK	2				
Lectures deal with use of computers in safety systems of nuclear reactor, with requirements on their hardware and software. Attention is devoted to s	oftware life cycle	, to software				
requirements, design, coding, integration of HW/SW, verification/validation, maintenance and configuration management of software. Requirements a	and limitation of p	rogramming				
languages by software coding are discussed. Problematic of programmable logical devices (CPLD, FPGA) for use in safety and control systems of nu	clear devices was	s introduces into				
lectures. Subject is also completed by demonstration of validation of operational power measuring and independent power protection systems of VR	1 reactor I&	C				
17EK Economics of Nuclear Facilities	ZK	2				
The course focuses on the economic evaluation of nuclear power plants, including assessment of the impact of the lifetime of nuclear installations. The	he first lectures a	re focused on				
the introduction to economics and further on the basic course of microeconomics. The lectures continue with an overview of the business economics	, explanations of	the concepts of				
revenues, costs etc. and their application in the evaluation of the sources of energy. The second half of the lectures are focused on the economic aspe	ects of the fuel cy	cle, construction				
and operation of power plants and also their decommissioning. In conclusion, the students will get acquainted with the basic methods of economic evaluation of investments.						
and operation of power plants and also their decommissioning. In conclusion, the students will get acquaimed with the basic methods of economic effective and operation of power plants and also their decommissioning.						
17IMF Computer Science for Modern Physicists	KZ	3				
	KZ	3				
17IMF Computer Science for Modern Physicists	KZ use of specialize	3 ed computing				
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17SIPS	Simulation of NPP Operational States	KZ	3			
This course is pointed to	pass to students the idea about main operating features of nuclear power plants with various types of reactors, about physical	coupling amid sir	igle components			
of nuclear power plants	and about principles of operating. In the theoretical part, there is briefly described each power plant and its simulator and sir	nulator?s physica	l background.			
The main part of this co	urse is dedicated to practising of various tasks (rated output, transiensts, malfunction of components) on simulators. The cou	urse takes place ir	n simulators of			
following power units: V	VER-440, VVER-1000, ABWR and CANDU 6. During these exercises the basic physical features of system are always analy	sed and there are	also given			
reasons of their change	s and connections between them.					
01SUP	Start-up Project	KZ	2			
17TYPR	Team project	KZ	4			
Within the subject "Tear	n project", a group of students will jointly solve a task in the field of nuclear engineering. The offered topics will be known at th	ne time of enrolling	g the course, but			
the choice of a specific	task will take place in the first lecture of the course. The aim of the course is to provide students with experience from working	g together on a pr	oject, which they			
can apply in further pro-	can apply in further professional activities. The output of the solution is a joint research report and its defense. There must be no doubts who was involved in which part of solving the					
task. The division of tasks will take place within the team. The subject garant enters this process and directs it. Regular team meetings are expected during the research project, but						
the course garant convenes at least two joint meetings during the semester, which will allow him to monitor the progress of the task and the involvement of students. The garant will						
also provide a suitable	professional advisor who will help students with orientation in the problem and with the necessary analytical or experimental	methods and tool	S.			

List of courses of this pass:

	Name of the course Completi	on Credits
01SUP	Start-up Project KZ	2
02KFM	Quantum Physics Z,ZK	3
State description	on, wave function, postulates of quantum mechanics, Born's statistical interpretation, expectation values, Schrödinger equation, Heisenberg uncerta	nty principle,
	quantization of angular momentum, solution of simple systems, hydrogen atom.	
14NAMA	Materials Science KZ	3
	Introduction to the Materials Science.	•
14NMR	Materials Science for Reactors ZK	2
	Materials for classical and fusion reactors	
15PCJE	Chemistry Programme of Nuclear Power Plants Z,ZK	3
The course deals	with the principles of water technology and chemistry of nuclear power plants (NPP). The main attention is paid to the individual technological opera	ons used to th
purification of fee	eding waters and cooling circuits waters and of all liquid and gaseous radioactive media encountered in NPP. The technological operations used for t	ne treatment of
wastes and the co	prosion problems of the construction materials are discussed in detail, too. Students will be able to evaluate and to assess the effect of technologica	parameters o
	the processes of water treatment and decontamination.	
16APIZ1	Applications of Ionizing Radiation 1 ZK	3
Applications of ic	onizing radiation 1 inclusive of radioanalytical methods and application of radionuclides and ionizing radiation for analysis and diagnostics of industri	I and research
	processes.	
16DPJI1	Master Thesis 1 Z	10
The diploma proje	ect is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor	during commo
	regular meetings and discussions.	
16DPJI2	Master Thesis 2 Z	20
The diploma proje	ect is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor	during commo
	regular meetings and discussions.	
	Metrology of Ionizing Radiation Z,ZK uces students to the metrology, including its legislative framework. Fundamental and general concepts of the field (calibration, verification, legally cont	
The course introdu instruments, me	Metrology of Ionizing Radiation Z,ZK uces students to the metrology, including its legislative framework. Fundamental and general concepts of the field (calibration, verification, legally cont easuring standards, measurement accuracy) are explained. Further, the methods of atomic and nuclear physics quantities determination (activity, so radiation exposure, absorbed dose) are discussed in detail.	olled measurin Irce emission,
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get familiar with topic of design-basis incidents and following design extensions for reactor VR-1. Students will be acquainted with common calculation codes for safety analyses and

0	they will also gain hands-on experience with model problems.		
17CIBS	Digital Safety Systems of Nuclear Reactors	Z,ZK	2
	th use of computers in safety systems of nuclear reactor, with requirements on their hardware and software. Attention is devoted to so		
,	sign, coding, integration of HW/SW, verification/validation, maintenance and configuration management of software. Requirements and		0 0
	vare coding are discussed. Problematic of programmable logical devices (CPLD, FPGA) for use in safety and control systems of nucle Ibject is also completed by demonstration of validation of operational power measuring and independent power protection systems of		
17DERF	Deterministic Methods in Reactor Physics	KZ	4
	d to nuclear data processing for mathematical modeling in nuclear reactor physics, to analytical and numerical solution of various det		1
	nethods in nuclear reactor physics and to nuclear reactor burn-up modeling. Stress is put on practical examples, exercises and individ		
-	After passing the course the attendees obtain not only theoretical knowledge, but also practical experience with various methods and		-
	neutron-physical characteristics of nuclear facilities and their application on real reactor systems.		
17EK	Economics of Nuclear Facilities	ZK	2
	es on the economic evaluation of nuclear power plants, including assessment of the impact of the lifetime of nuclear installations. The		
	economics and further on the basic course of microeconomics. The lectures continue with an overview of the business economics, et	•	•
	c. and their application in the evaluation of the sources of energy. The second half of the lectures are focused on the economic aspects of power plants and also their decommissioning. In conclusion, the students will get acquainted with the basic methods of economic (-	
17ERF	Experimental Reactor Physics	KZ	4
	cused on experimental methods used for determination of neutron-physical and basic operational parameters of on nuclear reactors.		-
	heir classification and utilisation in the field of experimental reactor physics, experimental methods focused on reactivity measurement		
characteristics in	the nuclear reactor, dynamics study of nuclear reactor, realisation of the critical experiment. Within the last lectures is prepared basic	c critical experiment	nt at VR-1
reactor. The lectu	ires are supplemented with experimental practices at the training reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining reactor VR-1: reactivity measurement, control rod calibration, dynamical straining r	-	ar reactor,
(prediction of unknown critical state. The main part of practices is focused on realization of basic critical experiment at VR-1 real		
17FARE	Nuclear Reactor Physics	Z,ZK	
-	ear reactor physics builds on previously gained knowledge from fundamentals of reactor physics, kinetics, dynamics, thermohydraulics In transport theory introduction, trans-port equation formulation, and its utilization in reactor physics. The transport theory requires broad		
	how continuous and group-wise nuclear data are prepared and how the self-shielding effect is respected in heterogeneous reactors.	0	
	ory. The importance of the adjoint flux for uncertainty and sensitivity calculations in reactor physics will be explained. The final part of		
	calculations of neutronics, termohydraulics, and thermomachanics in nuclear reactors.		
17HAV	Accidents of Nuclear Installations	KZ	4
-	ecture is focused on basic principles of management of severe accidents, specific requirements that are described in SAMG (Serious	-	
	ncy operating procedures) based on definition of Czech legal framework. Students will enhance their knowledge of technologies and ma	-	
	essary to successfully manage a serious accident. In addition a theoretical background will be presented for basic phenomenology of n products, source term, and introduction to physical and chemical basis of selected processes that are frequent in nuclear power pla		
	des for accident analyses utilization and understanding of basic calculation aspects. Specific phenomena will be presented with the help		
	power plants, namely TMI-2 and Fukushima.		
17IMF	Computer Science for Modern Physicists	KZ	3
	Computer Science for Modern Physicists puters became an everyday and inherent part of the science and engineering, use of them is often reduced to ?office? tasks and to u		-
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17NJZ	New Nuclear Sources	ZK	3
Course is devoted	to new nuclear power systems. Students get familiar with reactor designs for near term future as well as with designes under considerated	tion for mid-term ar	nd long-term
outlook. Course o	overs reactor systems of generation III+, gen. IV., accelerator driven systems, fusion systems, their concept, advantages, disadvanta	ges, evolution, curr	rent status,
	outlook.		1
17PAJE	Intership in Nuclear Power Plant	Z	2
1	e serves to get a deeper knowledge of systems and the operation of a nuclear power plant. The practice is organized on the nuclear power plant. The practice is organized on the nuclear power plant is the second set of a superscript of the second set of the second second set of the second second set of the second set of the second set of the second set of the second se		
where students ge	et to know all important parts of a nuclear power plant during an extended excursion and get a basic concept of reactor physicist or op training center and a simulator is a part of the practice.	perator activities. I	ne visit of a
17PALX		ZK	2
	Nuclear Fuel Cycle th introduction to the nuclear fuel cycle of nuclear power plants, particularly PWR which are in operation in the Czech Republic or are un		1
	zech Republic. The first part of the course is focused on front-end of the nuclear fuel cycle, the second part is focused on fuel utilisation		-
	third part of the course is focused on back-end of the nuclear fuel cycle.		
17PENF	Advanced Experimental Neutron Physics	KZ	4
	with non-reactor neutron sources, neutron detection, determination of basic properties of radionuclide neutron sources (AmBe, Cf25.	1	1
Boner spheres and	scintillation detectors, neutron beam attenuation by various materials, acceleration based neutron sources (D-D, D-T generators), prop	erties of photoneut	ron sources,
	neutron dosimetry, neutron activation analysis, and more.		
17PERF	Advanced Experimental Reactor Physics	KZ	4
	sed on advanced experimental methods used in determination of neutron-physical and operational parameters of nuclear reactors. Atte		
	rmination of microscopic theory parameters, determination of reactor power, measurement of reactivity in deep subcritical states, det		
	rmination of reactor transfer function and study of Cherenkov radiation in nuclear reactor. Lec-tures devote to the theoretical basis for		
	ory parameters, determination of reactor power at low or zero power reactors, application of noise analysis and pulsed neutron source nd detection of Cherenkov radiation in nuclear reactor. The lectures are complemented by the laboratory exercises at the VR-1 trainin		
	the practical application of the mentioned methods at the real nuclear facility.	9 .000101 10 5110W 1	
17PRF	Core Physics and Fuel Management	Z.ZK	3
	used on inner nuclear fuel cycle of the nuclear power plants, particularly PWR used and / or planned in the Czech Republic. The first	, ,	-
	e core physics, e.g. fuel changes during the cycle, burn-up, changes of keff during the cycle, xenon poisonings and xenon oscillations	-	
part of the course	consists of NPP fuel cycle, fuel burn-up and fuel management, e.g. fuel handling, fuel management, reactor operation, burn-up, fuel I	oading, fuel reload	ling, loading
pattern, legislativ	re requirements for the core, core loading and fuel handling, fuel cycle of WWERs PWR, Fuel cycle of Dukovany & amp; Temelín NPP,	fuel cycle of wester	ern PWRs,
BWR fuel cycle, C	CANDU fuel cycle. At the end of the course basic information about MOX fuel is mentioned. Note: Front-end & amp; back-end of the nu	clear fuel cycle of	the nuclear
	power plants is the part of 17JPC - Nuclear fuel cycle course		-
17ROJ	Radiation Protection of Nuclear Facilities	ZK	2
The course is aim	ed at gaining a deeper knowledge in the field of radiation protection of the biological effects of ionizing radiation; exposure assessme	nt and its optimizat	tion for staff
470100	and personnel in nuclear facilities.	1/7	
17SIPS	Simulation of NPP Operational States	KZ	3
	ted to pass to students the idea about main operating features of nuclear power plants with various types of reactors, about physical colliplants and about principles of operating. In the theoretical part, there is briefly described each power plant and its simulator and simulator.		
	this course is dedicated to practising of various tasks (rated output, transiensts, malfunction of components) on simulators. The cours		-
	units: VVER-440, VVER-1000, ABWR and CANDU 6. During these exercises the basic physical features of system are always analyst		
511	reasons of their changes and connections between them.		5
17SMRF	Stochastic Methods in Reactor Physics	KZ	4
Course is intende	d to nuclear data processing for mathematical modeling in nuclear reactor physics, to analytical and numerical solution of various def	erministic methods	s in reactor
1 -	nethods in nuclear reactor physics and to nuclear reactor burn-up modeling. Stress is put on practical examples, exercises and individ		-
of given exercises	a. After passing the course, the attendees obtain not only theoretical knowledge, but also practical experience with various methods a	nd approaches to r	modeling of
	neutron-physical characteristics of nuclear facilities and their application in real reactor systems.		
17SPEK	Gamma-ray Spectroscopy	KZ	4
	rse is to get students familiar with the topics of nuclear gamma spectrometry. Students will acquire detailed knowledge on the nature of g	-	
	companying effects, the effects of detector response, detector characteristics and nuclear data, and tools useful for gamma spectroso will be made familiar with the gamma-ray measurements and gamma spectrometers, especially with precise semiconductor detectors		
	nma-ray spectrometer, and with character and effects affecting the gamma-ray spectrum creation. They will get the practical experien		
	experimental activities at the Training reactor VR-1, and focused on application in nuclear analytical methods and neutron activation		
17TERP	Thermomechanics of Nuclear Fuels	Z,ZK	4
	Thermomechanics of Nuclear Fuels introduces the fundamentals of fuel thermomechnics and fuel per-formance. The introductory levels	· ·	1
	ar fuels with an emphasis on light water reactors. The key parts of nuclear fuel cycle are reminded to students as well. Single compon		
	om fuel pellets over pellet-cladding gap to cladding and design of the assembly. Physical models related to thermal, mechanical and p	, ,	
	ed including the effects related to the fuel burnup. After the introduction of particular models, interlinks and feedbacks are presented in	-	
design and nuclea	r safety. The design and construction of fuel assemblies is presented at the end with calcula-tions of their mechanical design. The theo	ry will be further ap	plied during
4	exercises by using thermomechanical codes such as FRAPCON and FRAPTRAN.		
17THAR	Thermohydraulic Design of Nuclear Reactors	ZK	4
	Is theoretical knowledge from the course Thermohydraulics of nuclear reactors and different thermohydraulics courses and shows its . Students come to know more about flow and heat transfer in the fuel bundles and different methods of thermohydraulic design of react		-
	students come to know more about now and near transfer in the fuel bundles and different methods of thermonydraulic design of react thannel analysis and use of system codes for these purposes. Coupling of the mentioned methods and coupling with different calculation		
	bleted with exercises during which students practice theory on practical tasks which are solved by SW codes: CFD ANSYS group, AL	-	
	RELAP.	,	
17THYR	Thermohydraulics of Nuclear Reactors	Z,ZK	4
	student's basic knowledge in the field of thermohydraulics of nuclear reactors, which they obtain in their previous study. Students are	· ·	1
	on together with forced convection and boiling crisis analyses in the nuclear core conditions. The temperature distribution in the coolar		-
together with the t	nermohydraulic of the full nuclear reactor core, including the hot channel theory. The parts of the course are also lectures about comp	ressible fluid flow t	heory (ideal
	and turbulent flow and its modelling. Explication is focused on understanding and application of knowledge for basic thermohydraulic	-	
safety analyses	and shows todays limits of knowledge. One lecture is focused on special convection to uncommon coolants, which can be applied for	r example in gen. I	V nuclear
	reactors.		
17TNAP	Thermomechanical Design of Nuclear Fuels	KZ	4
	ermomechanical design of nuclear fuels directly follows the course 17TMECH. The fundamental knowledge introduced in the 17TMECH results of the safety reports of light water reactors. (Chapter - Reactor) and design of nuclear fuels including advanced concern		
	r subchapters of the safety reports of light water reactors (Chapter - Reactor) and design of nuclear fuels including advanced concep	is. All of the compo	JUCINS allu

their construction of nuclear fuel system are introduced (fuels, cladding, assemblies, control assemblies) together with their links to fundamental safety and operational functions of nuclear reactors. The safety/operational/limiting criteria used by US NRC and OECD/NEA will be discussed together with their origin and implications to nuclear reactor construction. Standard operational modes as well as transport, storage or disposal of nuclear fuels are included. These limitations will be practically studied by simulation codes Bison and FAST. New fuel designs and advanced fuel concepts will be presented at the end including Lightbridge fuel, double-cooled fuels, accident tolerant fuels together with current trends towards

increasing enrichment and burnups.					
17TYPR	Team project	KZ	4		
Within the subject "	Team project", a group of students will jointly solve a task in the field of nuclear engineering. The offered topics will be known at the ti	me of enrolling the	course, but		
the choice of a spe	cific task will take place in the first lecture of the course. The aim of the course is to provide students with experience from working tog	jether on a project	, which they		
can apply in furthe	r professional activities. The output of the solution is a joint research report and its defense. There must be no doubts who was involve	ed in which part of	solving the		
task. The division	of tasks will take place within the team. The subject garant enters this process and directs it. Regular team meetings are expected du	ring the research p	project, but		
the course garant	convenes at least two joint meetings during the semester, which will allow him to monitor the progress of the task and the involvement	nt of students. The	garant will		
also provide	a suitable professional advisor who will help students with orientation in the problem and with the necessary analytical or experimer	ital methods and to	ools.		
17VRAO	Spent Nuclear Fuel and Radioactive Wastes	ZK	4		
In frame of this subj	ect, students are familiarized with sources of radioactive wastes, system of their classification and handling. Spent nuclear fuel and RAV	V handling is activit	ty subjected		
to permission and is bound with national legal framework. Different strategies exist for the SNF and RAW handling which are country specific. Each strategy requires usage of unique					
technologies and processes in dependence on national law.					
17VYRE	Nuclear Research Installations	ZK	4		
The course is focused on technology, operation and utilisation of nuclear research installations (research reactors) and its particular features comparing to nuclear power plants. At the					
beginning of the course history and classification of re-search reactors are discussed. The second part is focused on research reactor operation, safety, management as well as to					

intention to build research reactor, construction and commissioning of research reactor. The third part of the course deal with research reactors utilisation such as neutron activation analysis, radioisotope production, neutron imaging, silicon doping etc. The last part of lectures is dedicated to research reactor technology and examples of typical subcritical and critical assemblies; low, medium and high power research reactors which are in operation worldwide. The course also consists of hands-on laboratories at the Training reactor VR-1 which give students practical application of the theory presented during the lectures. Part of the laboratories is hands-on training of the VR-1 reactor operation when students are learning how to operate the reactor.

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2025-06-30, time 22:14.