





<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Methodology of scientific research			
<b>Teachers:</b> Savić M. Miroslav, Krajnović M. Dušanka, Kotur-Stevuljević M. Jelena, Bogavac-Stanojević B. Nataša			
<b>Course status:</b> Mandatory common, module: Doctoral academic studies			
<b>Semester:</b> I	<b>Year of studies:</b> I		
<b>ECTS points:</b> 5	<b>Course code:</b> Д1031		
<b>Requirements:</b> none			
<b>Course aims:</b> The aim of this course is to provide participants with general scientific skills in order to formulate a scientific problem and plan the experiment, as well as to understand the complete process of preparation and publication of scientific research results			
<b>Course outcomes:</b> By the end of this course participants will be able to summarize and apply the principles of the methodology of scientific-research work and scientific writing			
<b>Course contents:</b> Science and scientific method. Problem and scientific problem. Hypothesis. Hypothesis verification: scientific observation and scientific experiment. Common methodology of scientific research in biomedicine. Classification of research. Experimental research in laboratory. Animal experiments. Types of studies in epidemiological investigations. Ethics and biomedical investigations. Ethical codex of scientific-research work. Generation of biomedical information. Communications. Networks. Internet. Internet search engines. Authorship/co-authorship. Role and duties of principal investigator. Protection of intellectual property. Classification of scientific work. Writing of scientific and professional papers. Literature citing. Review process. Oral presentation of scientific work (adaptation to audience and situation). Designing PowerPoint slides for a scientific presentation. Introduction to writing of project proposals. Master's thesis and doctoral dissertation.			
<b>Recommended literature:</b> 1 Cargill, M, O'Connor P. Writing scientific research articles: Strategy and steps. John Wiley & Sons, 2013. 2. Baumgartner TA, Hensley LD. Conducting and Reading Research in Health and Human performance. Mc Graw Hill, Boston, 2006 3. Machin D, Campbell MJ. Design of studies for medical research. John Wiley & Sons, Hoboken, 2005. 4. Peat J, Elliot E, Baur L, Keena V. Scientific writing – easy when you know how. BMJ Books, London, 2002. 5. Albert T. The A-Z of medical writing. BMJ Books, London, 2000. 6. Hudson Jones A, McLeallan F. Ethical Issues in Biomedical Publication. Baltimore: John Hopkins University Press, 2000.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures and study-research work			
<b>Grading system:</b> Seminar: 30 points; written exam: 70 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Statistics in research			
<b>Teachers:</b> Bogavac-Stanojević B. Nataša, Kotur-Stevuljević M. Jelena			
<b>Course status:</b> Mandatory common, module: Doctoral academic studies			
<b>Semester:</b> I	<b>Year of studies:</b> I		
<b>ECTS points:</b> 5	<b>Course code:</b> D1032		
<b>Requirements:</b> One semester of undergraduate studies in mathematics and statistics pharmaceutical / medical biochemistry / medicine			
<b>Course aims:</b> Understanding advanced statistical methods. Applying advanced statistical analyses in scientific research.			
<b>Course outcomes:</b> After completing the course students will be trained to: <ul style="list-style-type: none"> <li>- Recognizing the type of statistical analysis</li> <li>- Interpret the significance of the obtained statistical indicators and discuss the results,</li> <li>- Understand the importance of the application of statistical methods in the scientific research,</li> <li>- Use statistical software in the data analysis</li> </ul>			
<b>Course contents:</b> One-way analysis of variance (ANOVA). Two-way analysis of variance. ANOVA with replication. Post-hoc tests. Simple linear regression analysis. Multiple regression analyses. Logistic regression. Analysis of covariance. Nonparametric analysis of variance. Nonparametric correlation. Chi-square test. Confidence interval. Student's research: Solving different statistical problems and tasks.			
<b>Recommended literature:</b> <ol style="list-style-type: none"> <li>1. Sheskin DJ. Handbook of parametric and nonparametric statistical procedures Chapman &amp; Hall/CRC, Washington, D.C., 2000.</li> <li>2. Vittingoff E, Shiboski SC, Glidden DV, McCulloch CE. Regression Methods in Biostatistics, Springer Science + Business Media, New York, 2005.</li> <li>3. Selvin S. Statistica Analysis of Epidemiological Data, Oxford University Press, Oxford, 1996.</li> <li>4. Tamhane AJ, Dunlop DD. Statistics and Data Analysis, Prentice Hall, Upper Saddle River, NJ, 2000.</li> </ol>			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, computer exercises, solving practical problems			
<b>Grading system:</b> The presence at lectures: 30 points; Written Exam: 70 points.			


<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>	
<b>Course title:</b> Seminar 1		
<b>Teachers:</b> Ivanović P. Darko, Zečević L. Mira, Malenović M. Anđelija, Stojanović S. Biljana, Miletić Đ. Ivanka, Šobajić S. Slađana, Stanković M. Ivan, Đorđević I. Brižita, Vuleta M. Gordana, Milić R. Jela, Primorac M. Marija, Savić D. Snežana, Vasiljević D. Dragana, Krajišnik R. Danina, Đekić M. Ljiljana, Spasić M. Slavica, Jelić-Ivanović D. Zorana, Spasojević-Kalimanovska V. Vesna, Stojanov D. Marina, Ignjatović D. Svetlana, Topić S. Aleksandra, Dopsaj B. Violeta, Bogavac-Stanojević B. Nataša, Kotur-Stevuljević M. Jelena, Tasić M. Ljiljana, Marinković D. Valentina, Krajnović M. Dušanka, Miljković R. Branislava, Vezmar Kovačević D. Sandra, Vučićević M. Katarina, Kovačević N. Nada, Petrović D. Silvana, Maksimović A. Zoran, Kundaković D. Tatjana, Drobac M. Milica, Ugrešić D. Nenad, Stepanović-Petrović M. Radica, Savić M. Miroslav, Ilić V. Katarina, Novaković N. Aleksandra, Tomić A. Maja, Leposavić M. Gordana, Arsenović-Ranin M. Nevena, Stojić-Vukanić M. Zorica, Plečaš-Solarović A. Bosiljka, Pešić P. Vesna, Nedeljković S. Miodrag, Milenković T. Marina, Antić Stanković A. Jelena, Parojčić V. Jelena, Ibrić R. Svetlana, Đuriš D. Jelena, Grbić V. Sandra, Đurić R. Zorica, Vladimirov M. Sote, Agbaba D. Danica, Bulat L. Zorica, Matović J. Vesna, Antonijević M. Biljana, Vujanović L. Dragana, Đukić M. Mirjana		
<b>Course status:</b> Mandatory common, module: Doctoral academic studies		
<b>Semester:</b> I	<b>Year of studies:</b> I	
<b>ECTS points:</b> 5	<b>Course code:</b> D1033	
<b>Requirements:</b> none		
<b>Course aims:</b> This course aims to enable the participant to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; apply the principles of making a successful oral presentation in English.		
<b>Course outcomes:</b> By the end of this course participants will be able to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; apply the principles of making a successful oral presentation in English		
<b>Course contents:</b> Collection of pertinent literature (by use of bibliographic databases, web sites of publishers, general search engines). Preparation of personal databases. Contextual analysis of key publications in a field. Preparation and presentation of the published results.		
<b>Recommended literature:</b> 1. Alley M. The craft of scientific presentations. Critical steps to succeed and critical errors to avoid. Springer-Verlag New York, Inc., 2003. 2. Original scientific papers and review articles in the field of the participant's research activity.		
<b>The total of active learning classes</b>	<b>Lectures:</b> 30	
	<b>Individual research work:</b> 60	
<b>Teaching methods:</b> Study-research work		
<b>Grading system:</b> Seminar: 70 points; written exam: 30 points		

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>	
<b>Course title:</b> Seminar 2		
<b>Teachers:</b> Ivanović P. Darko, Zečević L. Mira, Malenović M. Anđelija, Stojanović S. Biljana, Miletić Đ. Ivanka, Šobajić S. Slađana, Stanković M. Ivan, Đorđević I. Brižita, Vuleta M. Gordana, Milić R. Jela, Primorac M. Marija, Savić D. Snežana, Vasiljević D. Dragana, Krajišnik R. Danina, Đekić M. Ljiljana, Spasić M. Slavica, Jelić-Ivanović D. Zorana, Spasojević-Kalimanovska V. Vesna, Stojanov D. Marina, Ignjatović D. Svetlana, Topić S. Aleksandra, Dopsaj B. Violeta, Bogavac-Stanojević B. Nataša, Kotur-Stevuljević M. Jelena, Tasić M. Ljiljana, Marinković D. Valentina, Krajnović M. Dušanka, Miljković R. Branislava, Vezmar Kovačević D. Sandra, Vučićević M. Katarina, Kovačević N. Nada, Petrović D. Silvana, Maksimović A. Zoran, Kundaković D. Tatjana, Drobac M. Milica, Ugrešić D. Nenad, Stepanović-Petrović M. Radica, Savić M. Miroslav, Ilić V. Katarina, Novaković N. Aleksandra, Tomić A. Maja, Leposavić M. Gordana, Arsenović-Ranin M. Nevena, Stojić-Vukanić M. Zorica, Plečaš-Solarović A. Bosiljka, Pešić P. Vesna, Nedeljković S. Miodrag, Milenković T. Marina, Antić Stanković A. Jelena, Parojčić V. Jelena, Ibrić R. Svetlana, Đuriš D. Jelena, Grbić V. Sandra, Đurić R. Zorica, Vujić B. Zorica, Čudina A. Olivera, Bulat L. Zorica, Matović J. Vesna, Antonijević M. Biljana, Vujanović L. Dragana, Đukić M. Mirjana		
<b>Course status:</b> Mandatory common, module: Doctoral academic studies		
<b>Semester:</b> II	<b>Year of studies:</b> I	
<b>ECTS points:</b> 5	<b>Course code:</b> D1034	
<b>Requirements:</b> none		
<b>Course aims:</b> This course aims to enable the participant to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; upgrade his/her capacities for giving a successful oral presentation in English.		
<b>Course outcomes:</b> By the end of this course participants will be able to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; apply the principles of making a successful oral presentation in English		
<b>Course contents:</b> Collection of pertinent literature (by use of bibliographic databases, web sites of publishers, general search engines). Preparation of personal databases. Contextual analysis of key publications in a field. Preparation and presentation of the published results.		
<b>Recommended literature:</b> 1. Alley M. The craft of scientific presentations. Critical steps to succeed and critical errors to avoid. Springer-Verlag New York, Inc., 2003. 2. Original scientific papers and review articles in the field of the participant's research activity.		
<b>The total of active learning classes</b>	<b>Lectures:</b> 30	
	<b>Individual research work:</b> 60	
<b>Teaching methods:</b> Study-research work		
<b>Grading system:</b> Seminar: 70 points; written exam: 30 points		

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>	
<b>Course title:</b> Seminar 3		
<b>Teachers:</b> Ivanović P. Darko, Zečević L. Mira, Malenović M. Anđelija, Stojanović S. Biljana, Miletić Đ. Ivanka, Šobajić S. Slađana, Stanković M. Ivan, Đorđević I. Brižita, Vuleta M. Gordana, Milić R. Jela, Primorac M. Marija, Savić D. Snežana, Vasiljević D. Dragana, Krajišnik R. Danina, Đekić M. Ljiljana, Spasić M. Slavica, Jelić-Ivanović D. Zorana, Spasojević-Kalimanovska V. Vesna, Stojanov D. Marina, Ignjatović D. Svetlana, Topić S. Aleksandra, Dopsaj B. Violeta, Bogavac-Stanojević B. Nataša, Kotur-Stevuljević M. Jelena, Tasić M. Ljiljana, Marinković D. Valentina, Krajnović M. Dušanka, Miljković R. Branislava, Vezmar Kovačević D. Sandra, Vučićević M. Katarina, Kovačević N. Nada, Petrović D. Silvana, Maksimović A. Zoran, Kundaković D. Tatjana, Drobac M. Milica, Ugrešić D. Nenad, Stepanović-Petrović M. Radica, Savić M. Miroslav, Ilić V. Katarina, Novaković N. Aleksandra, Tomić A. Maja, Leposavić M. Gordana, Arsenović-Ranin M. Nevena, Stojić-Vukanić M. Zorica, Plečaš-Solarović A. Bosiljka, Pešić P. Vesna, Nedeljković S. Miodrag, Milenković T. Marina, Antić Stanković A. Jelena, Parojčić V. Jelena, Ibrić R. Svetlana, Đuriš D. Jelena, Grbić V. Sandra, Đurić R. Zorica, Vujić B. Zorica, Čudina A. Olivera, Bulat L. Zorica, Matović J. Vesna, Antonijević M. Biljana, Vujanović L. Dragana, Đukić M. Mirjana		
<b>Course status:</b> Mandatory common, module: Doctoral academic studies		
<b>Semester:</b> III	<b>Year of studies:</b> II	
<b>ECTS points:</b> 5	<b>Course code:</b> D2031	
<b>Requirements:</b> none		
<b>Course aims:</b> This course aims to enable the participant to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; upgrade his/her capacities for giving a successful oral presentation of results of personal research activities		
<b>Course outcomes:</b> By the end of this course participants will be able to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; apply the principles of making a successful oral presentation in English		
<b>Course contents:</b> Collection of pertinent literature (by use of bibliographic databases, web sites of publishers, general search engines). Preparation of personal databases. Contextual analysis of key publications in a field. Preparation and presentation of the published results.		
<b>Recommended literature:</b> 1. Alley M. The craft of scientific presentations. Critical steps to succeed and critical errors to avoid. Springer-Verlag New York, Inc., 2003. 2. Original scientific papers and review articles in the field of the participant's research activity.		
<b>The total of active learning classes</b>	<b>Lectures:</b> 30	
	<b>Individual research work:</b> 60	
<b>Teaching methods:</b> Study-research work		
<b>Grading system:</b> Seminar: 70 points; written exam: 30 points		

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Seminar 4			
<b>Teachers:</b> Ivanović P. Darko, Zečević L. Mira, Malenović M. Anđelija, Stojanović S. Biljana, Miletić Đ. Ivanka, Šobajić S. Slađana, Stanković M. Ivan, Đorđević I. Brižita, Vuleta M. Gordana, Milić R. Jela, Primorac M. Marija, Savić D. Snežana, Vasiljević D. Dragana, Krajišnik R. Danina, Đekić M. Ljiljana, Spasić M. Slavica, Jelić-Ivanović D. Zorana, Spasojević-Kalimanovska V. Vesna, Stojanov D. Marina, Ignjatović D. Svetlana, Topić S. Aleksandra, Dopsaj B. Violeta, Bogavac-Stanojević B. Nataša, Kotur-Stevuljević M. Jelena, Tasić M. Ljiljana, Marinković D. Valentina, Krajnović M. Dušanka, Miljković R. Branislava, Vezmar Kovačević D. Sandra, Vučićević M. Katarina, Kovačević N. Nada, Petrović D. Silvana, Maksimović A. Zoran, Kundaković D. Tatjana, Drobac M. Milica, Ugrešić D. Nenad, Stepanović-Petrović M. Radica, Savić M. Miroslav, Ilić V. Katarina, Novaković N. Aleksandra, Tomić A. Maja, Leposavić M. Gordana, Arsenović-Ranin M. Nevena, Stojić-Vukanić M. Zorica, Plečaš-Solarović A. Bosiljka, Pešić P. Vesna, Nedeljković S. Miodrag, Milenković T. Marina, Antić Stanković A. Jelena, Parojčić V. Jelena, Ibrić R. Svetlana, Đuriš D. Jelena, Grbić V. Sandra, Đurić R. Zorica, Vujić B. Zorica, Čudina A. Olivera, Bulat L. Zorica, Matović J. Vesna, Antonijević M. Biljana, Vujanović L. Dragana, Đukić M. Mirjana			
<b>Course status:</b> Mandatory common, module: Doctoral academic studies			
<b>Semester:</b> IV	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> D2032		
<b>Requirements:</b> none			
<b>Course aims:</b> This course aims to enable the participant to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; upgrade his/her capacities for giving a successful oral presentation of results of personal research activities; prepare publications containing the results obtained in the performed personal investigation			
<b>Course outcomes:</b> By the end of this course participants will be able to: search the scientific literature effectively and thoroughly; perform a critical analysis of publications relevant for his/her study field; apply the principles of making a successful oral presentation and preparing publications containing the personal results			
<b>Course contents:</b> Collection of pertinent literature (by use of bibliographic databases, web sites of publishers, general search engines). Preparation of personal databases. Contextual analysis of key publications in a field. Preparation and oral and written presentation of the personal results.			
<b>Recommended literature:</b> 1. Alley M. The craft of scientific presentations. Critical steps to succeed and critical errors to avoid. Springer-Verlag New York, Inc., 2003. 2. Original scientific papers and review articles in the field of the participant's research activity.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 60		
<b>Teaching methods:</b> Study-research work			
<b>Grading system:</b> Seminar: 70 points; written exam: 30 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>	
<b>Course title:</b> Toxicology-Selected Topics		
<b>Teachers:</b> Matović J. Vesna, Antonijević M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica		
<b>Course status:</b> Mandatory modules, module: Toxicology		
<b>Semester:</b> I	<b>Year of studies:</b> I	
<b>ECTS points:</b> 10	<b>Course code:</b> ДТО1ОМ1	
<b>Requirements:</b> none		
<b>Course aims:</b> To gain knowledge (including evaluation) on general principles of toxicology as an introduction for the study of certain groups of poisons and toxicological disciplines as well as to gain knowledge on the most important toxic agents from different fields of toxicology.		
<b>Course outcomes:</b> Gained knowledge on general toxicology and most important toxic agents in different fields of toxicology.		
<b>Course contents:</b> Multidisciplinary character of toxicology. Toxicity concept and toxicological profile. Dose-response. Local and systemic toxic effects. Toxicity tests. Toxicokinetics and toxicodynamics. Genotoxicity. Basis of toxicological and ecotoxicological risk assessment. Regulatory affairs in toxicology. Studying the following groups of toxic agents: gaseous poisons that are of concern in occupational and ecotoxicology and their effects on human health and environment; toxicology of organic solvents and persistent organic pollutants; chronic exposure to toxic metals and consequent therapy; toxicology of pesticides and their effects on human health and pesticides residues; drug poisoning; overdose caused by psychoactive controlled substances.		
<b>Recommended literature:</b> 1. Timbrell JA. Introduction to Toxicology, CRC Press, 2002. 2. Casaret and Doull's Toxicology: The Basic Science of Poisons. Ed.: Curtis D. Klaassen, McGraw-Hill Companies, Inc., USA, 7th Ed, 2008. 3. Marquardt H, Schafer SG, McClellan R, Welsch F: Toxicology. Academic Press, USA, 1999. 4. Manahan SE: Toxicological Chemistry and Biochemistry. Lewis Publishers, USA, 2003. 5. Mulder JG and Dencker L. Pharmaceutical Toxicology Ed.: Mulder JG and Dencker L. Pharmaceutical Press, 2006. 6. Olson KR. Poisoning & Drug Overdose. New York: Lange Medical Books, 4th Ed, 2004. 7. Moffat Ac. Osselton MD, Widop B. Clark's analysis of drugs and poisons in pharmaceutical, body fluids and post-mortem materials. Moffat Ac. Osselton MD, Widop B. Third edition Pharmaceutical Press London 2004.		
<b>The total of active learning classes</b>	<b>Lectures:</b> 60	
	<b>Individual research work:</b> 60	
<b>Teaching methods:</b> Lectures, practical courses, consultations, discussions		
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points		


<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Principles of use of animals for scientific purposes			
<b>Teachers:</b> Todorović M. Zoran, Savić M. Miroslav			
<b>Course status:</b> Mandatory modules, module: Toxicology			
<b>Semester:</b> I	<b>Year of studies:</b> I		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО10М2		
<b>Requirements:</b> none			
<b>Course aims:</b> The aim of this course is to provide participants with knowledge about principles of breeding, handling and use of animals used for scientific purposes, including legislation in Serbia, European Union and world, as well as of anaesthesia and surgery of laboratory animals (work in vivo).			
<b>Course outcomes:</b> By the end of this course participants will have gained an understanding of legislation and principles of breeding, handling and work with animals used for scientific purposes.			
<b>Course contents:</b> Legislation and ethical questions related to work with animals used for scientific purposes. Principles of laboratory experiment. Principles of Good laboratory practice. Breeding and caring for animals used for scientific purposes. Animal welfare. Monitoring the health status and the most common diseases of animals used for scientific purposes. Use of animals in laboratory (routes of treatment application, introduction to anaesthesia and analgesia). Surgical procedures on animals used for scientific purposes. Practical laboratory work.			
<b>Recommended literature:</b> 1. Wolfensohn S, Lloyd M. Handbook of laboratory animal management and welfare. John Wiley & Sons, 2013. 2. Wilking MR (ed). Experimental Therapeutics, Martin Dunitz, Ltd., London, 2003.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures and study-research work			
<b>Grading system:</b> Seminar: 50 points; written exam: 50 points			





<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Mechanisms of Toxicity			
<b>Teachers:</b> Matović J. Vesna, Antonijević.M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> Mandatory modules, module: Toxicology			
<b>Semester:</b> II	<b>Year of studies:</b> I		
<b>ECTS points:</b> 10	<b>Course code:</b> ДТО10М3		
<b>Requirements:</b> none			
<b>Course aims:</b> To gain, analyse and evaluate knowledge on the mechanisms of toxicity.			
<b>Course outcomes:</b> Gained knowledge on the mechanisms of toxicity.			
<b>Course contents:</b> Toxicokinetic and toxicodynamic factors as basic mechanisms of toxicity. Types of toxic responses. Selective toxicity. Cellular transfer and bioaccumulation of toxic agents. Metabolism as the process of bioactivation. Molecular mechanisms of toxicity: covalent binding with endogenous substrates, binding with enzymes and other proteins, oxidative stress (effects of poisons on the parameters of oxidative stress: on reactive oxygen and nitrogen species and on enzymatic and non-enzymatic parameters of antioxidant defense system) apoptosis and necrosis, impairment of cells proliferation and cells repair, effects of poisons on ionic channels, immune system, and on specific receptors. Toxic effects on proteins, lipids and genetic material. Reparative cellular mechanisms. Mechanisms of toxicity of a single toxic agent or a mixture; analysis of these mechanisms of toxicity.			
<b>Recommended literature:</b> 1. Mulder JG and Dencker L. Pharmaceutical Toxicology Ed.: Mulder JG and Dencker L. Pharmaceutical Press, 2006. 1. Plant N. Molecular Toxicology. BIOS Scientific Publishers, London and New York, 2003. 2. Boelsterli UA. Mechanistic Toxicology. Informa Healthcare, New York, USA, 2009. 3. Aldridge WN, Mechanisms and Concepts in Toxicology, Taylor&Francis, London, UK, 1996. 4. Barile FA. Clinical Toxicology Principles and Mechanisms, CRC Press, Boca Raton, USA, 2004. 5. Roberts R, Ed. Apoptosis in Toxicology, Taylor&Francis, London, UK, 2000.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 60		
	<b>Individual research work:</b> 60		
<b>Teaching methods:</b> Lectures, practical courses, consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Models and Methods in Toxicology			
<b>Teachers:</b> Matović J. Vesna, Antonijević M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> Mandatory modules, module: Toxicology			
<b>Semester:</b> III	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО2ОМ1		
<b>Requirements:</b> passed the exams from the first year			
<b>Course aims:</b> To gain, applicate, analyse and evaluate knowledge and skills in the field of models and methods used in toxicology.			
<b>Course outcomes:</b> Gained knowledge and skills will enable a finished PhD student to choose and applicate appropriate models and methods in toxicology, as well to estimate critical assessment and interpretation of the obtained results concerning the character and significance of toxic effect.			
<b>Course contents:</b> Methods in toxicology: in silico, in vitro, in vivo. Theoretical basis of probit analysis in toxicology and tests of acute toxicity (Litchfield and Wilcoxon test, Well test). Quantification of local toxic effects: tests of irritation and sensibilisation. (Draize test, Magnusson and Kligman test). Methods for assessment of genotoxic and mutagenic effects, carcinogenicity, reproductive and developmental toxicity. Quantification of threshold and non threshold effects, hormesis phenomenon. Assessment of no observed adverse effect level (NOAEL) and Benchmark (BMD) dose, advantages and limitations. Models for estimations of (non)genotoxic carcinogenic efect. Linear extrapolation and polinomials application for genotogic carcinogenic effect. Assessment of toxic effect of substance in a mixture and its quantification. Epidemiological studies in toxicology and meta analysis. Toxicokinetic models. Models and methods used for toxicological risk assessment. Deterministic and probabilistic models. Softwers used in toxicology.			
<b>Recommended literature:</b> 1. Greim H, Snyder R.Toxicology and Risk Assessment. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England, 2008. 2. Casaret and Doull's Toxicology: The Basic Science of Poisons. Ed.: Curtis D. Klaassen, McGraw-Hill Companies, Inc., USA,7th Ed, 2008. 3. Hayes AW. Principles and Methods of Toxicology. Fourth Edition, Taylor&Fransis, 2001.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			


<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Ecotoxicology			
<b>Teachers:</b> Matović J. Vesna, Antonijević.M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> II	<b>Year of studies:</b> I		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО1И1		
<b>Requirements:</b> Toxicology-Selected Topics, Mechanisms of Toxicity			
<b>Course aims:</b> To gain, analyse and evaluate knowledge in the field of ecotoxicology.			
<b>Course outcomes:</b> Gained knowledge in ecotoxicology that will enable a finished PhD student to be a qualified person in a team competent for environment pollution monitoring and environmental management.			
<b>Course contents:</b> Basic concept of ecotoxicology as a science. Interphase transport and distribution of pollutants in the environment. Bioconcentration, bioaccumulation and biomagnification of pollutants and their entrance into the food chain. Response of a person, population, community and ecosystem to one or more environmental pollutants (molecular, physiological and behavioral approach). Biomonitoring and biomarkers of hazards in the environment. Global effects in the environment: climate changes, depletion of ozone layer in stratosphere, acidification, air, water and soil pollution, waste. The most important pollutants of atmosphere, hydrosphere and litosphere. Effects of pollution on human health, plants and animals. Ecotoxicological risk assessment. Environmental management and regulatory affairs.			
<b>Recommended literature:</b> 1. Walker CH, Hopkin SP: Principles of Ecotoxicology (2nd edition). Ed.: Walker CH et al. Taylor and Francis, USA and Canada, 2001. 2. Newman MC, Unger MA: Fundamentals of Ecotoxicology (2nd edition). Ed.: Lewis publishers. CRC Press LLC, Boca Roton, USA, 2003. 3. Hoffman DJ, Rattner BA, Burton GA, Cairns J. Handbook of ecotoxicology, 2nd edition CRC Press LLC, USA, 2003. 4. Conell D, Lam P, Richardson B and Wu R. Introduction to Ecotoxicology. Blackwell Science, 1999. 5. Paustenbach DJ, Ed. Human and Ecological Risk Assessment, John Wiley and Sons, New York, USA, 2002.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses, consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Occupational Toxicology			
<b>Teachers:</b> Matović J. Vesna, Antonijević M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> II		<b>Year of studies:</b> I	
<b>ECTS points:</b> 5		<b>Course code:</b> ДТО1И2	
<b>Requirements:</b> Toxicology-Selected Topics, Mechanisms of Toxicity			
<b>Course aims:</b> To gain, analyse and evaluate knowledge in the field of occupational toxicology.			
<b>Course outcomes:</b> Gained knowledge in occupational toxicology that will enable a finished PhD student to competently participate and manage the affairs in the field of occupational toxicology.			
<b>Course contents:</b> Ambient monitoring (stationary and continuous monitoring, "spot" monitoring, personal monitoring) and biological monitoring (biological markers of exposure and biological markers of effects). Maximal allowed concentrations for air and biological material, and other parameters of concern for toxicological assessment in this field. Selective and non-selective tests of exposure. Biotoxicological parameters in assessment of recent and long-term exposure. The most important agents that are causes of professional intoxications: gasses, organic solvents, metals, pesticides. Toxicokinetics, systemic effects, mechanisms of toxicity, analytics, therapy and prevention. Epidemiological studies. Regulatory affairs.			
<b>Recommended literature:</b> 1. Vidaković A. Medicina rada II, KCS-Institut za medicinu rada i radiološku zaštitu »Dr Dragomir Karajović«, Beograd i Udruženje za medicinu rada Jugoslavije, 1997. 2. Casaret and Doull's Toxicology: The Basic Science of Poisons. Ed.: Curtis D. Klaassen, McGraw-Hill Companies, Inc., USA, 7th Ed, 2008. 3. Nordberg GF, Fowler BA, Nordberg M, Friberg LT. Handbook on the Toxicology of Metals, Elsevier, North.Holland Biomedical Press, Holandija 3rd Ed., 2007. 4. Carter RE, Ed. Organic Solvents: Properties, Toxicity, and Industrial Effects, Nova Science Pub Incorporated, 2011.			
<b>The total of active learning classes</b>		<b>Lectures:</b> 30	
		<b>Individual research work:</b> 30	
<b>Teaching methods:</b> Lectures, practical courses, consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			


<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Analytical toxicology			
<b>Teachers:</b> Matović J. Vesna, Antonijević.M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> II		<b>Year of studies:</b> I	
<b>ECTS points:</b> 5		<b>Course code:</b> ДТО1И3	
<b>Requirements:</b> Toxicology-Selected Topics, Mechanisms of Toxicity			
<b>Course aims:</b> To gain, analyse and evaluate knowledge and skills in the field of analytical toxicology.			
<b>Course outcomes:</b> Gained knowledge in analytical toxicology that will enable a finished PhD student to competently participate and manage the affairs in the field of analytical toxicology.			
<b>Course contents:</b> Samples, sampling, transport and storage of samples. Possible contamination of samples. Current procedure and sampling instruments. Modern procedures for sample preparation in toxicological practice (methods of extraction, mineralisation, etc). Specificity of clinical, forensic and occupational toxicological laboratories. The significance of analytics in monitoring of toxic agents in the environment and occupational ambience. Screening methods. Qualitative and quantitative analysis. Application of different techniques in toxicological practice: HPLC, GC, GC/MS, LC/MS, AAS (flame and flameless) ICP, NAA, RIA, immunoassay methods, etc. Interpretation of the results. Toxicological report. Principles of good laboratory practice. Accreditation of toxicological laboratories.			
<b>Recommended literature:</b> 1. Clarke's Isolation and Identification of drugs in pharmaceuticals, body fluids and post-mortem material. Ed.: Moffat AC, Osseltom MD, Widdop B, Watts J. The Pharmaceutical Press, London, 2011. 2. Flanagan RJ, Taylor A, Watson ID, Whelpton R. Fundamentals of Analytical Toxicology, John Wiley & Sons, England, 2007. 3. Clarke's Analytical Forensic Toxicology, Jickells S, Negrusz A. Eds., Pharmaceutical Press, London, UK, 2008. 4. Skoog DA, Holler FJ, Crouch SR, Principles of instrumental analysis, Brooks/Cole, 2007 5. Popek EP, Sampling And Analysis Of Environmental Chemical Pollutants:A Complete Guide, Academic Press, 2003.			
<b>The total of active learning classes</b>		<b>Lectures:</b> 30	
		<b>Individual research work:</b> 30	
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>	
<b>Course title:</b> Toxicological Risk Assessment		
<b>Teachers:</b> Matović J. Vesna, Antonijević M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica		
<b>Course status:</b> elective, module: Toxicology		
<b>Semester:</b> II	<b>Year of studies:</b> I	
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО1И4	
<b>Requirements:</b> Toxicology-Selected Topics, Mechanisms of Toxicity		
<b>Course aims:</b> To gain, applicate, analyse and evaluate knowledge and skills in the field of toxicological risk assessment.		
<b>Course outcomes:</b> Gained knowledge in toxicological risk assessment will enable a finished PhD student to competently participate in toxicological risk assessment and to analyse and estimate the obtained risk and used methodology.		
<b>Course contents:</b> Basic terms and definitions: risk, hazard, risk assessment, risk management. Significance of toxicological risk assessment. Phases of risk assessment. Identification of hazard: in silico, in vitro, in vivo toxicity tests, epidemiological studies and case reports. Parameters of toxicity in acute and prolonged exposure. Assessment of dose-response relation: threshold effect and no threshold effect, critical toxic effect. Exposure assessment: sources of exposure, route of intake, duration and frequency of exposure, exposed (sub)population. Models of exposure assessment: deterministic and propabilistic models: advantages and restrictions. Risk characterization. Application of biomarkers in risk assessment. Application of toxicokinetic models in risk assessment. Agregative, cummulative and integrative risk assessment. Risk assessment of exposure to low doses and its specificity. Risk assessment of carcinogenic and/or genotoxic substances. Softwers for risk assessment. Risk interpretation: variability and uncertainty. Good evaluation practice. Risk management.		
<b>Recommended literature:</b> 1. Nielsen E, Řstergaard G, Larsen JC. Toxicological Risk Assessment of Chemicals: A Practical Guide, Informa Healthcare USA, Inc., 2008. 2. Greim H, Snyder R. Toxicology and Risk Assessment. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England, 2008. 3. Paustenbach DJ. Human and ecological risk assessment. Ed.: Paustenbach DJ. John Wiley and Sons, Inc., New York, USA, 2002.		
<b>The total of active learning classes</b>	<b>Lectures:</b> 30	
	<b>Individual research work:</b> 30	
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions		
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points		


<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Toxicology of Drugs and Controlled Psychoactive Substances			
<b>Teachers:</b> Matović J. Vesna, Antonijević.M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> III	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО2И1		
<b>Requirements:</b> passed the exams from the first year			
<b>Course aims:</b> To gain, analyse and evaluate knowledge and skills in the field of toxicology of drugs and controlled psychoactive substances.			
<b>Course outcomes:</b> Gained current knowledge in the toxicology of drugs and controlled psychoactive substances will enable a finished PhD student to participate and manage the affairs in this field of toxicology.			
<b>Course contents:</b> Epidemiological data on drug poisonings. Mono- and poly-drug poisonings. Acute and chronic intoxication. Specific groups of drugs- the the most common causes of intoxication: (narcotic and non-narcotic analgetics, antipyretics, sedatives, antipsychotics, anticonvulsants, cardiovascular drugs): toxicokinetics, mechanism of action and toxicity, acute and chronic toxicity, therapy, analytics. Drugs in environment. Ecotoxicological aspects. Medical and pharmaceutical waste. Risk assessment: exposure assessment and risk characterization. Drugs of abuse: alcohol, heroin and other opioids, cocaine, amphetamines, nicotine, caffeine, benzodiazepines, barbiturates, LSD, phencyclidine, cannabinoids, anabolic steroids. Chemical structure and effect. Toxicokinetics, toxicodynamics and mechanisms of toxicity. Tolerance, dependence and withdrawal syndrome. Analytics in biological material. Therapy and preventiopn. Regulatory affairs.			
<b>Recommended literature:</b> 1. Blachford S., Krapp K. (eds.) Drugs and Controlled Substances Information for Students. Thompson Gale, 2002. 2. Emmett D, Nice G. Understanding Street Drugs. Jessica Kingsley Publishers, London, UK, 2006. 3. Olson KR. Poisoning & Drug Overdose. New York: Lange Medical Books, 4th Ed, 2004. 4. Cole MD. The Analysis of Controlled Substances, John Wiley & Sons Ltd., 2003. 5. Barile FA.Clinical Toxicology Principles and Mechanisms, CRC Press, Boca Raton, USA, 2004.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			


<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Food Toxicology			
<b>Teachers:</b> Matović J. Vesna, Antonijević.M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> III	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО2И2		
<b>Requirements:</b> passed the exams from the first year			
<b>Course aims:</b> To gain, analyse and evaluate knowledge and skills in the field of food toxicity.			
<b>Course outcomes:</b> Gained current knowledge in food toxicity will enable a finished PhD student to participate and manage the affairs in this field of toxicology.			
<b>Course contents:</b> Toxic substances in food: "natural" origin chemicals, aditives and pollutants. Direct food aditives: colors, antimicrobial agents, antioxidants, enzymes, fumigants, lubricants, sweeteners, etc. Indirect food additives. Unavoidable contamination during growth, storage, or processing: chlorinated organics, heavy metals, mycotoxins, pesticides residues, drugs (for food of animal origin). Toxic substances produced by cooking. Miscellaneous contaminants in food. Regulatory affairs in food toxicology. Risk assessment: assessment of exposure, risk characterization, risk/benefit analysis.			
<b>Recommended literature:</b> 1. Wetzel DLB, Charalambous G., Instrumental Methods in Food and Beverage Analysis, Elsevier science, Amsterdam, The Netherlands, 1998. 2. Helferich W, Winter CK. Food toxicology, Boca Raton, Fla. ;London, CRC Press, 2001. 3. Püssa T. Principles of food toxicology, Boca Raton : CRC Press, 2008. 4. Altug T. Introduction to toxicology and food, Boca Raton, Fla.,CRC Press, 2003.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			



<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Toxicology of Metals			
<b>Teachers:</b> Matović J. Vesna, Antonijević M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> III	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО2ИЗ		
<b>Requirements:</b> passed the exams from the first year			
<b>Course aims:</b> To gain, analyse and evaluate knowledge and skills in the field of metal toxicity.			
<b>Course outcomes:</b> Gained current knowledge in toxicology of metals that will enable a finished PhD student to competently participate and manage the affairs in this field of toxicology.			
<b>Course contents:</b> General characteristics of metals, metals redistribution: natural and geological cycles, antropogenic factors; factors influencing toxicity, toxic effect on humans, mechanisms of toxicity. Metals' importance in the field of occupational toxicology and ecotoxicology. Metals as air, water and food pollutants. Organometallic compounds and their toxicological significance. The effect of metals on genetic material. Metals as endocrine disruptors. Biological monitoring and biotoxicological parameters. Therapy-chelating agents. Prophylaxis. Analytics: preparing procedures, methods for qualitative and quantitative analyses, interpretation of the results. Toxicological and ecotoxicological risk assessment. Regulatory affairs.			
<b>Recommended literature:</b> 1. Nordberg GF, Fowler BA, Nordberg M, Friberg LT. Handbook on the Toxicology of Metals, Elsevier, North. Holland Biomedical Press, Holandija 3rd Ed., 2007. 2. Koropatnick DJ, Zalups RK. Molecular biology and toxicology of metals, Taylor & Francis, London, UK, 2000. 3. Sledge EB, Toxicology of metals : biochemical aspects, Springer, London, UK, 2012. 4. Sigel A, Sigel H, Sigel RKO. Metal ions in toxicology : effects, interactions, interdependencies, Cambridge : Royal Society of Chemistry, UK, 2010. 5. Bnfalvi G. Ed. Cellular effects of heavy metals, Springer Dordrecht ; New York, 2011.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Toxicology of Pesticides			
<b>Teachers:</b> Matović J. Vesna, Antonijević M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> III	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО2И4		
<b>Requirements:</b> passed the exams from the first year			
<b>Course aims:</b> To gain, applicate, analyse and evaluate knowledge and skills in the field of pesticides toxicity.			
<b>Course outcomes:</b> Gained current knowledge in toxicology of pesticides that will enable a finished PhD student to assess toxicological characteristics and a risk during the exposure to pesticides.			
<b>Course contents:</b> Pesticides: definition and classes. Toxicological significance of pesticides. Regulatory affairs in biocides and plant protecion products. Insecticides (organochlorine and organophosphorus insecticides, carbamates, piretroides, etc), herbicides (bispiridinium compounds, phenylacetic acid derivatives, dinitrophenols, triazine herbicides, etc), fungicides (organometallic compounds, fungicides of new generation), rodenticides (bromadiolon, brodifakum): toxicokinetic characteristics, metabolism, mechanisms of toxicity, biomarkers of exposure and effect, acute intoxication, chronic intoxication, prolonged exposure to low doses, therapy, analytics in biological material and samples from the environment. Ecotoxicological significance of pesticides. Fate and behavior in the environment. Residues and evaluation of maximum residues levels. Interactions of pesticides. Concept of cumulative risk assessment for organophosphorus and carbamates exposure. Risk assessment: exposure assessment and risk characterization.			
<b>Recommended literature:</b> 1. Costa LG, Galli CL, Murphy SD. Toxicology of Pesticides: Experimental, Clinical and Regulatory Perspectives. Springer London, Limited, 2011. 2. Hayes' Handbook of Pesticide Toxicology. Third edition. Ed., Krieger R, Academic Press, 2010.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Toxicology of Organic Solvents			
<b>Teachers:</b> Matović J. Vesna, Antonijević.M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> III	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО2И5		
<b>Requirements:</b> passed the exams from the first year			
<b>Course aims:</b> To gain, applicate, analyse and evaluate knowledge and skills in the field of toxicology of organic solvents.			
<b>Course outcomes:</b> Gained current knowledge in toxicology of organic solvents that will enable a finished PhD student to participate and manage the affairs in this field of toxicology.			
<b>Course contents:</b> Organic solvents of concern in occupational toxicology. Organic solvents of concern for general population, especially those being cosmetic products ingrediants. Exposure, doses, kinetics of organic solvents. General and specific toxic effects. Mechanisms of toxicity. Aliphatic hydrocarbons (C5-C8); halogenated aliphatic hydrocarbons- methylene chloride, chloroform, carbontetrachloride, methylchloroform, tetrachloroethylen; aromatic hydrocarbons- benzen and its derivatives; aliphatic alcohols/ethanol, methanol, n-buthanol; glycols- diethylene glycol, propylene glycol; glycol ethers; carbon disulfide, etc. Protective measures and therapy. Toxicological risk assessment. Regulatory affairs.			
<b>Recommended literature:</b> 1. Luttrell WE, Jederberg WW, Still KR. Toxicology principles for the industrial hygienist, Fairfax, VA : American Industrial Hygiene Association, 2008. 2. Wypych G. Handbook of solvents, ChemTec Publ, Toronto, Canada, 2001. 3. Toxicological profiles. Public Health Service, Agency for Toxic Substances and Disease Registry. 4. Health Safety Guides, WHO. 5. Environmental Health Criteria, WHO/IPCS.			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			

<b>University of Belgrade</b> <b>Faculty of Pharmacy</b>	<b>DOCTORAL ACADEMIC STUDIES</b>		
<b>Course title:</b> Toxicology of Persistent Organic Pollutants			
<b>Teachers:</b> Matović J. Vesna, Antonijević M. Biljana, Đukić M. Mirjana, Vujanović L. Dragana, Bulat L. Zorica			
<b>Course status:</b> elective, module: Toxicology			
<b>Semester:</b> III	<b>Year of studies:</b> II		
<b>ECTS points:</b> 5	<b>Course code:</b> ДТО2И6		
<b>Requirements:</b> passed the exams from the first year			
<b>Course aims:</b> To gain, applicate, analyse and evaluate knowledge and skills in the field of toxicology of persistent organic pollutants.			
<b>Course outcomes:</b> Gained current knowledge in toxicology of persistent organic pollutants that will enable a finished PhD student to assess toxicological characteristics and a risk during the exposure to persistent organic pollutants.			
<b>Course contents:</b> Persistent organic pollutants: organochlorine insecticides, polichlorinated biphenyls, polichlorinated dibenzodioxins, polichlorinated dibenzofurans, polibrominated organic compounds. Toxicological and ecotoxicological significance. Fate and behavior in the environment: contamination of water, air and soil, bioaccumulation and biomagnification, entrance into food chain. Toxicokinetic characteristics, mechanisms of action, prolonged exposure to low doses, therapy, analytics in biological material, and samples from the environment. Interactions of persistent organica pollutants with other toxic substnaces. Regulatory affairs. Stockholm's convention. Theoretical concept of cummulative risk assessment, precautions and limitations, critical toxic effect, index substance, toxic equivalent factor. Risk assessment: exposure assessment and risk characterization.			
<b>Recommended literature:</b> 1. Dioxins and Health Including Other Persistent Organic Pollutants and Endocrine disrupters. Edited by Schecter A. John Wiley and Sons Inc., 2012. 2. TOXICOLOGICAL PROFILES. Public Health Service, Agency for Toxic Substances and Disease Registry, USA			
<b>The total of active learning classes</b>	<b>Lectures:</b> 30		
	<b>Individual research work:</b> 30		
<b>Teaching methods:</b> Lectures, practical courses , consultations, discussions			
<b>Grading system:</b> pre-exam activities: 30 points; oral exam: 70 points			