University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Methodology of scientific research

Teachers: Savić M. Miroslav, Krajnović M. Dušanka, Kotur-Stevuljević M. Jelena, Bogavac-Stanojević B. Nataša

Course status: Mandatory common, module: Doctoral academic studies

Semester: I	**Year of studies:** I
ECTS points: 5	**Course code:** Д1О31

Requirements: none

Course aims:

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

Course outcomes:

By the end of this course participants will be able to summarize and apply the principles of the methodology of scientific-researh work and scientific writing

Course contents:

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-researh 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.

Recommended literature:

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.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures and study-research work

Grading system:

Seminar: 30 points; written exam: 70 points

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Statistics in research

Teachers: Bogavac-Stanojević B. Nataša, Kotur-Stevuljević M. Jelena

Course status: Mandatory common, module: Doctoral academic studies

Semester: I	**Year of studies:** I
ECTS points: 5	**Course code:** Д1О32

Requirements: One semester of undergraduate studies in mathematics and statistics
pharmaceutical / medical biochemistry / medicine

Course aims:

Understanding advanced statistical methods. Applying advanced statistical analyses in scientific research.

Course outcomes:

After completing the course students will be trained to:

- Recognizing the type of statistical analysis
- Interpret the significance of the obtained statistical indicators and discuss the results,
- Understand the importance of the application of statistical methods in the scientific research,
- Use statistical software in the data analysis

Course contents:

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.

Recommended literature:

1. Sheskin DJ. Handbook of parametric and nonparametric statistical procedures Chapman & Hall/CRC, Washington, D.C., 2000.
2. Vitingoff E, Shiboski SC, Glidden DV, McCulloch CE. Regression Methods in Biostatistics,Springer Science + Business Media, New York, 2005.
3. Selvin S. Statistica Analysis of Epidemiological Data, Oxfor University Press, Oxford, 1996.
4. Tamhane AJ, Dunlop DD. Statistics and Data Analysis, Prentice Hall, Upper Saddle River, NJ, 2000.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, computer exercises, solving practical problems

Grading system:

The presence at lectures: 30 points; Written Exam: 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Seminar 1

Teachers: 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, Plećaš-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

Course status: Mandatory common, module: Doctoral academic studies

Semester: I	**Year of studies:** I
ECTS points: 5	**Course code:** Д1О33

Requirements: none

Course aims:

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.

Course outcomes:

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

Course contents:

Collecction 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.

Recommended literature:

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.

The total of active learning classes	**Lectures:** 30
	Individual research work: 60

Teaching methods:

Study-research work

Grading system:

Seminar: 70 points; written exam: 30 points

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Seminar 2

Teachers: 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, Plećaš-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

Course status: Mandatory common, module: Doctoral academic studies

Semester: II	**Year of studies:** I
ECTS points: 5	**Course code:** Д1О34

Requirements: none

Course aims:

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.

Course outcomes:

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

Course contents:

Collecction 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.

Recommended literature:

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.

The total of active learning classes	**Lectures:** 30
	Individual research work: 60

Teaching methods:

Study-research work

Grading system:

Seminar: 70 points; written exam: 30 points

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Seminar 3

Teachers: 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, Plećaš-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

Course status: Mandatory common, module: Doctoral academic studies

Semester: III	**Year of studies:** II
ECTS points: 5	**Course code:** Д2О31

Requirements: none

Course aims:

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 reserch activities

Course outcomes:

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

Course contents:

Collecction 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.

Recommended literature:

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.

The total of active learning classes	**Lectures:** 30
	Individual research work: 60

Teaching methods:

Study-research work

Grading system:

Seminar: 70 points; written exam: 30 points

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Seminar 4

Teachers: 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, Plećaš-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

Course status: Mandatory common, module: Doctoral academic studies

Semester: IV	**Year of studies:** II
ECTS points: 5	**Course code:** Д2О32

Requirements: none

Course aims:

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 reserch activities; prepare publications containing the results obtained in the performed personal investigation

Course outcomes:

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

Course contents:

Collecction 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.

Recommended literature:

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.

The total of active learning classes	**Lectures:** 30
	Individual research work: 60

Teaching methods:

Study-research work

Grading system:

Seminar: 70 points; written exam: 30 points

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Cosmetic ingredients

Teachers: Vuleta M. Gordana, Milić R. Jela, Savić D. Snežana, Petrović D. Silvana, Drobac M. Milica

Course status: Mandatory modules, module: Cosmetology

Semester: I	**Year of studies:** I
ECTS points: 10	**Course code:** ДКО1ОМ1

Requirements: one-semester undergraduate course in Cosmetology

Course aims:

To introduce the candidate with different groups of cosmetic ingredients, along with their properties, application, efficacy and safety aspects.

Course outcomes:

The candidate is able to independently make a selection of suitable cosmetic ingredients based on the assessment of their characteristics, according to the requirements set by the formulation process of a specific cosmetic product.

Course contents:

National legislation relating to cosmetic products; Regulatory reguirements on cosmetic products in European Union; Cosmetics Directive 76/768/EEC and Annexes; 6th and 7th Amendment of the Cosmetic Directive 76/768/EEC; Regulation No 1223/2009 of the European Parliament and of the Council on cosmetic products and its amendments; Good Manufacturing Practice in cosmetic industry; Classification of cosmetic ingredients according to origin: natural (plant, mineral or animal origin), synthetic and semi-synthetic; Cosmetic actives of different type: plant extracts in cosmetic preparations, proteins, peptides, glycosaminoglycans, vitamins, alpha-hydroxy acids, beta-hydroxy acids, etc; Lipid materials: fatty acids, fatty alcohols, waxes, ceramides, vegetable oils, hydrocarbons, synthetic lipids; Surface active materials; Surfactant-type emulsifiers, polymeric emulsifiers; Humectants; Polymers (thickeners, rheology modifiers and gelling agents); Preservatives and complexants; Antioxidants; Colours and pigments; UV-filters (chemical and physical); Nanomaterials; Various types of colloidal carriers for cosmetic actives: liposomes, nanosomes, microparticles, microspheres, microcapsules, nanoparticles (polymeric and solid lipid ones), oleosomes, micelles.

Recommended literature:

1. Rieger MM. Harry's Cosmeticology. 8th edition, New York: Chemical Publishing Co Inc, 2000.
2. De Polo KF. A Short Textbook of Cosmetology. Ausburg: Verlag Fur Chemishe Industrie, H. Ziokowski GmbH, 1998.
3. Vasiljević D, Savić S, Đorđević Lj, Krajišnik D. Priručnik iz kozmetologije. Beograd: Nauka, 2009.
4. Schlossman ML. Chemistry and Manufacture of Cosmetics: Cosmetic Specialties and Ingredients, Illinois: Allured Publishing Co, 2010.
5. Seifen, Öle, Fette, Wachse (journal specialized for cosmetology in EU - selected articles).
6. INCI Dictionaries.
7. Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009 on cosmetic products.
8. COSMOS-standard: Cosmetic organic and natural standard, Version 1.1– 31st January 2011, COSMOS-standard AISBL, Brussels, Belgium (www.cosmos-standard.org).

The total of active learning classes	**Lectures:** 60
	Individual research work: 60

Teaching methods:

Lectures, seminars, interactive methods, laboratory work.

Grading system:

Pre-exam assignments: 50 points; exam (oral): 50 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Theoretical aspects of cosmetic emulsions and gels

Teachers: Vuleta M. Gordana, Milić R. Jela, Savić D. Snežana, Vasiljević D. Dragana

Course status: Mandatory modules, module: Cosmetology

Semester: I	**Year of studies:** I
ECTS points: 5	**Course code:** ДКО1ОМ2

Requirements: one semester undergraduate course in Cosmetology; course: Cosmetic ingredients (first semester of doctoral studies).

Course aims:

Introduction to theoretical background of colloidal systems; Getting acquainted with stabilization mechanisms of emulsion systems with different consistencies and purposes; Introduction to formation and structure of gels with different gelling agents, factors important for emulsion and gel preparation; The possibilities of the application of theoretical premises in formulation of cosmetic emulsions and gels .

Course outcomes:

Application of the acquired knowledge in independently review and selection of a dispersion system in accordance with the purpose of cosmetic products, selection and characteristics of the necesssery emulsifiers. The student is also able to predict possible preparation techniques and methods of characterization of the formulated products.

Course contents:

Cosmetic emulsions - characteristics, types, contents, classification criteria and classification; Principles of emulsion preparation and stabilization; The choice of raw materials/ingredients for preparation of cosmetic emulsions of liquid and semi-solid consistencies (lotions and creams); Principles of stabilization and preparation/production methods of cosmetic emulsions - theoretical and practical aspects; Equipment for preparation/manufacture and principles; Good manufacturing practices (GMP) in preparation/production of cosmetic emulsions; Investigation of quality of emulsions of liquid and semi-solid consistencies; Cosmetic gels - characteristics, composition (formula), types, classification; Factors important for formulation, stability and application characteristics of gels; Choice and quality of cosmetic ingredients/raw materials for gel preparation; Methods of preparation/production of cosmetic gels - theoretical and practical aspects; Assesment of cosmetic gels quality.

Recommended literature:

1) Colloids in Cosmetics and Personal Care, Volume 4 (ed T. F. Tadros), Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany. doi: 10.1002/9783527631131. 2) Rieger MM. Harry s Cosmeticology. 8 th edition, New York chemical Publishing Co Inc. 2000 3) De Polo KF, A Short Text book of Cosmetology, Ausburg: Verlag Fur Chemishe Industrie, H. Ziokowski GmbH, 1998. 4) International Cosmetic Ingredient Dictionary and Handbook, 14th ed. The Personal Care Products Council, 2012. 5) Vasiljević D., Savić S., Đorđević Lj., Krajišnik D., Priručnik iz kozmetologije, Nauka, Beograd, 2007. 6) Rosen R.M, Delivery System Handbook for personal Care and Cosmetic Products, Tehnology, Applications and Formulations, Norwich, New York: William Andrew Publishing, 2005. 7) Seifen, Ole, Fette, Wachse Journal 8) Cosmetics & Toiletries magazine 9) Actifs et additifs en cosmetologie, edit. Martini M.C., Seiller M., Edition Tec & Dac, Paris, 1999.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, interactive sessions, practical classes and seminars.

Grading system:

Pre-exam assignments: 50 points; exam (oral): 50 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Formulation and characterization of cosmetic emulsions and gels

Teachers: Milić R. Jela, Savić D. Snežana, Vasiljević D. Dragana, Krajišnik D. Danina

Course status: Mandatory modules, module: Cosmetology

Semester: II	**Year of studies:** I
ECTS points: 10	**Course code:** ДКО1ОМ3

Requirements: one semester undergraduate course in Cosmetology; courses: Cosmetic ingredients (first semester of doctoral studies) and Theoretical aspects of cosmetic emulsions and gels (first semester of doctoral studies).

Course aims:

Theoretical and practical learning that will qualify student for an individual work in development of formulation and preparation techniques of cosmetic emulsions (lotions and creams) and cosmetic gels for different purposes.

Course outcomes:

Independence in approach to formulation and preparation of cosmetic emulsions (lotions and creams) and cosmetic gels for different purposes. The student is able to apply appropriate characterization techniques of these systems, their properties and physicochemical stability, aesthetic and application properties.

Course contents:

Preformulation, determination of the optimal composition and preparation method of cosmetic emulsions and creams; Selection of appropriate active substances and excipients (emulsifiers, oil phase ingredients, rheology modifiers) for formulation of oil/water and water/oil emulsions and creams, multiple emulsions, nanoemulsions, microemulsions, liposomes dispersions and nanoparticles prepared by emulsification methods; Formulation of emulsions and creams in order to achieve optimal sensorial characteristics accomplished with appropriate effects on skin as well as product stability; Methods of preparation and production equipment for preparation/manufacture of emulsions and creams; Characterization of cosmetic emulsions (liquid and semi-solid consistency) for various purposes - theoretical and practical aspects: use of different microscopic techniques, rheological measurement, thermal techniques, X-ray diffraction, photon correlation spectroscopy, Raman microscopic spectroscopy, laser diffractometry;The product stability considerations and potential skin effects; The types, characteristics and quality of gelling agents; Determination of the optimal composition and preparation methods of cosmetic gels; Preparation and characterization of cosmetic gels for various purposes - theoretical and practical aspects; The quality assessment and stability of cosmetic gels.

Recommended literature:

1. Colloids in Cosmetics and Personal Care, Volume 4 (ed T. F. Tadros), Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany. doi: 10.1002/9783527631131.

2. Rieger MM. Harry s Cosmeticology. 8 th edition, New York chemical Publishing Co Inc. 2000.

3. Kemper FH, Luepke P, Umbach W. Blue List cosmetic ingridients. Aulendorf: Editio Cantor Verlag, 2000.

4. Vasiljević D., Savić S., Đorđević Lj., Krajišnik D., Priručnik iz kozmetologije, Nauka, Beograd, 2009.

5. Rosen R.M, Delivery System Handbook for personal Care and Cosmetic Products, Tehnology, Applications and Formulations, Norwich, New York: William Andrew Publishing, 2005.

6. Schlossman ML, Chemistry and Manufacture of Cosmetics: Cosmetic Specialties and Ingredients, Allured Publishing Co., Illinois 2010.

7. Seifen, Ole, Fette, Wachse Journal. 8. Cosmetics & Toiletries magazine.

The total of active learning classes	**Lectures:** 60
	Individual research work: 60

Teaching methods:

Lectures, interactive sessions, practical classes and seminars.

Grading system:

Pre-exam assignments: 50 points; exam (oral): 50 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Physiological aspects of skin aging

Teachers: Plećaš-Solarović A. Bosiljka

Course status: elective, module: Cosmetology

Semester: II	**Year of studies:** I
ECTS points: 5	**Course code:** ДКО1И1

Requirements: Faculty of Pharmacy diploma; for candidates without diploma from medicinal group of faculties: passed exam from the selected chapters of skin hystology and physiology according to program of undergraduate pharmacy studies.

Course aims:

The aim of the course is to provide the participant with novel scientific data from the field of structure, function and skin aging which will enable following and understanding of some pathological skin conditions, as well as some fundamentals of preparation procedures and skin effects of cosmetic and dermatological drug products.

Course outcomes:

By the end of this course participant should have the ability of following the actual trends in formulation of cosmetic products intended for prevention and treatment of photoaged skin, based on knowledge of skin aging mechanism.

Course contents:

Skin as dynamic structure; Keratinocytes proliferation and role of cytokines; Epidermal response on skin barrier disruption and response mediators; Keratinocytes forming and arrangement; Synthesis, extrusion and rearrangement of intracellular lipids and desquamation. Factors affecting the skin structure and function; Free radicals – reactive oxygen species (ROS); UV irradiation; Skin aging; The role of ROS in skin aging – the influence on the cell structure, metabolism and genetic material; Enzymatic and vitamin antioxidants; Mechanisms of collagen, elastin and extracellular dermal matrix degradation; The role of matrix metalloproteinase (MMP) and tissue inhibitors of MMP; Melanogenesis and mechanisms of skin hyperpigmentation; Histological changes at epidermal and dermal level during skin aging; Clinical presentation of skin aging at epidermal and dermal level – mechanisms of appearing skin lines and skin texture changes.

Recommended literature:

1. P.T. Pugliese: Physiology of the Skin, Allured Publishing Corporation, Caroll Stream, Illinois, USA, 2001.
2. Bailey A.J.: Molecular mechanisms of ageing in connective tissues. Mech. Ageing Dev. 122: 735–755, 2001.
3. Werner S., Smola H.: Paracrine regulation of keratinocyte proliferation and differentiation. Trends Cell Biol. 11: 143-146, 2001.
4. Rigel DS, Weiss RA, Lim HW, Dover JS. Photoaging. Marcel Dekker, Inc. New York, Basel, 2004.
5. Timiras PS. Physiological Basis of Aging and Geriatrics, 4th edition. Informa Healthcare, USA, 2007.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, interactive learning and study-research work.

Grading system:

Pre-exam assignments: 30 points; exam (oral): maximal 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Preformulation of cosmetic products

Teachers: Milić R. Jela, Primorac M. Marija, Krajišnik R. Danina, Đekić M. Ljiljana

Course status: elective, module: Cosmetology

Semester: II	**Year of studies:** I
ECTS points: 5	**Course code:** ДКО1И2

Requirements: undergraduate course in Cosmetology; courses: Cosmetic ingredients (semester I of doctoral studies) and Formulation and characterization of cosmetic emulsions and gels (II semester of doctoral studies).

Course aims:

Knowledge and ability for individual evaluation of preformulation factors relevant for formulation of cosmetic products.

Course outcomes:

The students are qualified for preformulation, formulation, manufacturing and assesment of cosmetic products in accordance with current requirements for quality, safety and efficacy.

Course contents:

Physicochemical characteristics (solubility, pH value, viscosity, particle size etc.) of cosmetic ingredients and "active substances"; Evaluation of compatibility of cosmetic ingredients and cosmetic active substances; Benefits considerations for selected cosmetic ingredients in cosmetic products - physicochemical and physiological aspects; Stability of cosmetic ingredients and "active substances"; Considerations on compatibility between cosmetic ingredients (active and auxiliary substances) and packaging materials; Overview of approaches for protection of labile active substances (thermolability, oxidability, light induced degradation) by encapsulation in colloidal carriers such as: liposomes, niosomes, nanosomes, microparticles, nanoparticles, micelles.

Recommended literature:

1. Rieger MM. Harry s Cosmeticology. 8th edition, New York chemical Publishing Co Inc. 2000.
2. De Polo KF, A Short Text book of Cosmetology, Ausburg: Verlag Fur Chemishe Industrie, H. Ziokowski GmbH, 1998.
3. Regulation (EC) No 1223/2009 Of The European Parliament and of the Concil of 30 November 2009. on cosmetic products, Official Journal of the European Union, L342/59- L342/209.
4. Vasiljević D, Savić S, Đorđević Lj, Krajišnik D. Priručnik iz kozmetologije, Nauka, Beograd, 2009.
5. Rosen RM. Delivery System Handbook for personal Care and Cosmetic Products, Tehnology, Applications and Formulations, Norwich, New York: William Andrew Publishing, 2005.
6. Schlossman ML. Chemistry and Manufacture of Cosmetics: Cosmetic Specialties and Ingredients, Allured Publishing Co., Illinois, 2010.
7. International Cosmetic Ingredients Dictionary and Handbook, 14th ed. The Personal Care Products Council, 2012.
8. Revievws and original scientific papers published in relevant national and international journals: Arhiv za farmaciju, International Journal of Cosmetic Science, Cosmetic&Toiletries, SÖFW Journal, Journal of Cosmetic Dermatology, Skin Research&Technology.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, consultations, and seminars.

Grading system:

Pre-exam assignments: 30 points; exam (written): 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Preparation and application of plant extracts in cosmetic products

Teachers: Petrović D. Silvana, Drobac M. Milica

Course status: elective, module: Cosmetology

Semester: II	**Year of studies:** I
ECTS points: 5	**Course code:** ДКО1И3

Requirements: undergraduate studies in subjects Pharmacognosy and Cosmetology

Course aims:

Providing information and increasing knowledge on preparation, active principles and activity of plant extracts.

Course outcomes:

The candidate knows the preparation procedure, application and effects of the principal plant extracts in formulations of cosmetic products. The candidate is able to independently produce these extracts, assess quality and formulate cosmetic products for certain use.

Course contents:

Production and quality of raw plant materials; Choice of extraction methods and solvents; Types of plant extracts; Standardization and quantification of plant extracts; Labelling of plant extracts; Active principles of plant extracts: various classes of polyphenols (flavonoids, anthocyanins, tannins, phenol-carbonic acids), phenol glycosides, coumarins, essential oils, sesquiterpenes, triterpenes, saponins, purine derivates (purine alkaloids, allantoin); Quality control of plant extracts: identification and quantification of active principles (characterization of plant extracts); Purification of plant extracts and isolation of the active principles; Application of plant extracts in cosmetic products; Application of active plant principles in cosmetic products; Characterization of cosmetic products containing plant extracts; Estimation of stability.

Recommended literature:

1. Blumenthal M, Busse WR, Goldberg A, Gruenwald J, Hall T, Riggins CW, Rister RS. The Complete German Commission E Monographs. Austin: American Botanical Council, 1998.
2. Blumenthal M, Goldberg A, Brinckmann J. Herbal Medicine. Expanded Commission E Monographs. Austin: American Botanical Council, 2000.
3. Schulz V, Hänsel R, Tyler VE. Rational Phytotherapy. Berlin: Springer-Verlag, 2001.
5. Blumenthal M, Hall T, Goldberg A, Kunz T, Dinda, K. The ABC Clinical Guide to Herbs. Austin: American Botanical Council, 2003.
6. Dingermann T, Loew D. Phytopharmakologie. Experimentelle und klinische Pharmakologie pflanzlicher Arzneimittel. Stuttgart: Wissenschaftliche Verlagsgesellschaft mbH, 2003.
7. ESCOP Monographs. Stuttgart: Georg Thieme Verlag, 2003.
8. PDR for Herbal Medicines. Montvale: Thomson PDR, 2004.
9. Committee of Experts on Cosmetic Products with the collaboration of Patri F and Silano V. Plants in cosmetics. Plants and plant preparations used as ingredients for cosmetic products. Volume I. Strasbourg: Council of Europe Publishing, 2002.
10. Kovačević N. Osnovi farmakognozije. Beograd: Srpska školska knjiga, 2004.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

lectures, seminars.

Grading system:

Pre-exam assignments: 30 pt; exam (oral): 70 pt.

University of Belgrade Faculty of Pharmacy	DOCTORAL ACADEMIC STUDIES	

Course title: Analytics and quality control of cosmetic products

Teachers: Zečević L. Mira

Course status: elective, module: Cosmetology

Semester: II	**Year of studies:** I
ECTS points: 5	**Course code:** ДКО1И4

Requirements: Undergraduate course from Drug analytics; previous courses from Cosmetic ingredients (I semester of doctoral studies) and Formulation and testing of cosmetic emulsions and gels (II semester of doctoral studies).

Course aims:

The aim of the course is to introduce and enable the participant to choose and apply the most feasible method for quality control of cosmetic ingredients/products.

Course outcomes:

The candidate is able to independently choose and apply the most feasible method for quality control of cosmetic ingredients/raw materials and cosmetic products.

Course contents:

Analytics and quality control of officinal and non-officinal cosmetic ingredients/raw materials; Quality control of cosmetic products; Identification and quantification of active and auxiliary substances; Investigation of stability and purity of substances for cosmetic products; Employing of UV-VIS spectrophotometric methods in analytics and investigation of cosmetic products purity; Spectrofluorometric studies in analytics of cosmetic products; Novel IR techniques: FTIR and ATR use in analytics of cosmetic products; HPLC methods in cosmetology; Cosmetic colors: investigation of stability and purity using TLC and HPLC methods; Micellar and ion-pair liquid chromatography and gas chromatography in analytics of cosmetic products; Titrimetric methods in analytics of cosmetic products containing metal ions (Mg, Ca, Al in salt form); Types of detectors in analytics of cosmetic products; Validation of methods for investigation and quality control of cosmetic products; Types and significance of extraction in analytics of cosmetic products.

Recommended literature:

1. Rieger MM. Harry s Cosmeticology. 8 th edition, New York Chemical Publishing Co Inc.2000.
2. Handbook of modern pharmaceutical analysis,Satinder Ahuja and Stephen Scypinski, Academic Press, 2001.
3. Method validation in pharmaceutical analysis, J. Ermer and H. McB Miller, Wiley-VCH, 2000.
4. Spectrofluorimetric method for determination of panthenol in cosmetic and pharmaceutical formulations. Shehata, Mostafa A. M.; Sultan, Maha A.; Tawakkol, Shereen M.; Abdel Fattah, Laila E. Saudi Pharmaceutical Journal (2004), 12(1), 29-34.
5. Studies for analyzing the prohibited ingredients such as tetracaine hydrochloride in cosmetics. Tokunaga, Hiroshi; Takeuchi, Orie; Uchino, Tadashi; Ando, Masanori.Kokuritsu Iyakuhin Shokuhin Eisei Kenkyusho Hokoku (2004), 122 30-33.
6. TLC and HPLC study of new 9-phenylxanthene dyes. Konstantinova, Temenushka Neicheva; Neicheva, Anastasia Shopova; Venkova, Alexandrina Yoncheva: Journal of Planar Chromatography--Modern TLC (2004), 17(5), 369-371.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, seminars, laboratory work.

Grading system:

Pre-exam assignments: 30 points; exam (written): 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Selected chapters of dermatology

Teachers: Vesić A. Sonja

Course status: elective, module: Cosmetology

Semester: III	**Year of studies:** II
ECTS points: 5	**Course code:** ДКО2И1

Requirements: Undergraduate course from Physiology.

Course aims:

The aim of the course is providing the participant with comprehension and knowledge of some important symptoms of most common dermatoses interesting for formulator of cosmetic and dermocosmetic products.

Course outcomes:

The candidate is able to independently recognize some dermatoses and to evaluate the skin condition that is important during cosmetic/dermocosmetic product formulation development, its evaluation and application, as well as to competently collaborate with dermatologist.

Course contents:

Morphology of basic skin changes; Clinical and pathohistological presentation of skin efflorescence: erythema, puerperal angioma, telangiectasia, papule, vesicle, bullae, crust, tuber, nodes, atrophy, erosion, ulceration, eschara, rhagas, fissure, fistula; Deseborrhoeic dermatoses – Acne vulgaris, skin Seborrhoe , Rosacea, Acne rosacea, Eczema dysseboroicum, Pityriasis sicca et oleosa capilitii; Verrucosus skin changes: Verruca senilis, Verruca seborrhoica, Verruca plajuvenilis; Nevuses and hemangiomas; Skin pigmentation disorders – skin pigments, mechanisms of skin pigmentation, skin dyschromias (hyperchromia, hypochromia and achromia); Trichosis – hypertrichosis (hirsutism), hypotrichosis (alopecia). Photodermatoses; Skin types from cosmetologist point of view; Effects of physical therapy to the skin; Allergenic skin changes caused by cosmetic preparations; Epicutaneous allergological testing.

Recommended literature:

1. Kozmetička dermatologija. Načela i praksa. Leslie Baumann (the first edition in Croatian). Interpreta, Zagreb 2011.

2. T.Forster, Cosmetic lipids and the skin barrier, Cosmetic science and Technology series, M.Dekker, New York, vol. 24, 2002.

3. Loden M., Maibach HT, Dry Skin and Moisturisers: Chemisty and Function Boea Raton CPC Press, 2000.

4. Karadaglić Đ., Dermatologija, Vojnoizdavački zavod and Versalpress, Beograd, 2000.

5. Journal of American Academy of Dermatology (JAAD).

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, seminars, laboratory work.

Grading system:

Pre-exam assignments: 30 points; exam (oral): 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Dermocosmetic preparations

Teachers: Savić D. Snežana

Course status: elective, module: Cosmetology

Semester: III	**Year of studies:** II
ECTS points: 5	**Course code:** ДКО2И2

Requirements: One-semester undergraduate course in Cosmetology; lectures in courses: Cosmetic ingredients (first semester of doctoral studies) and Formulation and characterization of cosmetic emulsions and gels (second semester of doctoral studies).

Course aims:

The candidate is acquainted with the composition and properties of novel categories of cosmetic products that are developed and characterized by pharmacists in collaboration with dermatologists. Introduction to methodologies and techniques for efficacy and safety evaluation of dermocosmetic products, with the aim to enable the candidate to independently conduct experiments in scope of his/her doctoral dissertation.

Course outcomes:

The candidate is able to assess the formulation composition, expected effects and provide suitable critical opinion on the function, purpose and mode of application of dermocosmetic preparations.

Course contents:

Definition of dermocosmetic preparations/cosmeceuticals; Regulatory requirements relating to dermocosmetic preparations on a global level; Similarities and differences between a dermatological drug and a dermocosmetic preparation; Active substances in dermocosmetic preparations; Cosmeceuticals and barrier function of the skin; Physiological lipids for skin barrier regeneration and dry skin treatment; Dermocosmetic preparations used in atopic dermatitis skin: skin washing, cleaning, care and protection; Dermocosmetic preparations for acne treatment; Dermocosmetic preparations for rosacea skin; Dermocosmetic anti-age preparations: formulations for prevention of signs of premature skin aging vs. formulations for treatment of photo-aged skin; Dermocosmetic preparations for skin protection from sun exposure; Dermocosmetic preparations for babies and children; Application of in vitro media in evaluation of active substances efficacy in dermocosmetic preparations; Principles of dermocosmetic preparations formulation development; Efficacy assessment of dermocosmetic preparations – clinical trials; Application of in vitro media in safety evaluation of cosmeceuticals; In vivo studies for evaluation of dermocosmetic preparations safety profiles; Novel approaches in the research of dermocosmetic preparations.

Recommended literature:

1. Baumann L. Cosmetic dermatology: Principles and Practice (1st edition in Croatian). Zagreb: Interpreta, 2011.

2. Draelos ZD. Cosmeceuticals. 1st ed., Philadelphia: Elsevier Saunders, 2005.

3. Lodén M, Maibach HI. Dry skin and moisturizers. 1st ed., Boca Raton: CRC Press, 2000.

4. Čajkovac M. Kozmetologija. Zagreb: Naklada Slap, 2000 (selected chapters).

5. Rieger MM. Harry's Cosmeticology. 8th ed., New York: Chemical Publishing Co. Inc., 2000.

6. Review and original articles from national and international journals: Arhiv za farmaciju, International Journal of Cosmetic Science, Cosmetic&Toiletries, SÖFW Journal, Journal of Cosmetic Dermatology, Skin Research&Technology.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, seminars.

Grading system:

Pre-exam assignments: 30 points; exam (oral): 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Special-purposes cosmetics

Teachers: Primorac M. Marija, Milić R. Jela, Krajišnik R. Danina, Đekić M. Ljiljana

Course status: elective, module: Cosmetology

Semester: III	**Year of studies:** II
ECTS points: 5	**Course code:** ДКО2И3

Requirements: undergraduate course in Cosmetology; courses: Cosmetic ingredients (semester I of doctoral studies) and Formulation and characterization of cosmetic emulsions and gels (II semester of doctoral studies)

Course aims:

Introduction in formulation and methods of preparation/production and characteristics of cosmetic products for different purposes: anti-perspirants and deodorants, products for care of the teeth, the mouth and the skin, cosmetic products for men, cosmetic products for children, skin-protective cosmetic products, products for tanning without sun, skin-whitening products, make-up products (make-up powders, blushes, lipstics, eye-shadows, mascaras, nail lacquers).

Course outcomes:

The students know formulation, manufacturing/production and assesment of cosmetic products for special purposes: anti-perspirants and deodorants, products for care of the teeth, the mouth and the skin, cosmetic products for men, cosmetic products for children, skin-protective cosmetic products, products for tanning without sun, skin-whitening products, make-up products (make-up powders, blushes, lipstics, eye-shadows, mascaras, nail lacquers).

Course contents:

Formulation, manufacturing/production and assesment of cosmetic products for different purposes: anti-perspirants and deodorants, products for care of the teeth, the mouth and the skin, cosmetic products for men, cosmetic products for children, skin-protective cosmetic products, products for tanning without sun, skin-whitening products, make-up products (make-up powders, blushes, lipstics, eye-shadows, mascaras, nail lacquers); Selection of active and auxiliary ingredients - cosmetic row materials for specific cosmetic products, regarding their purpose, especially colours and pigments, as well nanomaterials for different purposes; Specificity in production processes and assesment of product characteristics, theri quality and stability; Methods for evaluation of effects and safety of cosmetic products for special purposes.

Recommended literature:

1. Rosen RM. Delivery System Handbook for Personal Care and Cosmetic Products, Technology, Applications and Formulations. Norwich, New York: William Andrew Publishing, 2005.
2. Vasiljević D, Savić S, Đorđević Lj, Krajišnik D. Priručnik iz kozmetologije, Nauka, Beograd, 2009.
3. International Cosmetic Ingredients Dictionary and Handbook, 14th ed. The Personal Care Products Council, 2012.
4. Čajkovac M, Kozmetologija, Naklada Slap, Zagreb, 2005.
5. Rieger MM, Harry's Cosmeticology., 2000, 8th ed., Chemical Publishing Co., Inc., New York.
6. De Polo KFD. A short textbook of cosmetology. 1998, 1st ed., H. Ziolkowsky GmbH, Augsburg.
7. Schlossman ML. Chemistry and Manufacture of Cosmetics: Cosmetic Specialties and Ingredients, Allured Publishing Co., Illinois 2010.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, consultations, and seminars.

Grading system:

Pre-exam assignments: 30 points; exam (written): 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Cosmetic hair products

Teachers: Vuleta M. Gordana, Krajišnik R. Danina, Đekić M. Ljiljana

Course status: elective, module: Cosmetology

Semester: III	**Year of studies:** II
ECTS points: 5	**Course code:** ДКО2И4

Requirements: one-semester undergraduate course in Cosmetology; lectures in courses: Cosmetic ingredients (first semester of doctoral studies) and Formulation and characterization of cosmetic emulsions and gels (second semester of doctoral studies).

Course aims:

1. Introduction to formulation approach and manufacturing of cosmetic hair products (hair washing, care, colouring, waving and straightening);

2. Ability to independently develop a formulation and manufacturing procedure of a specific hair care product.

Course outcomes:

The candidate is capable to independently perform preformulation, formulation, preparation and characterization of cosmetic hair products (hair washing, care, colouring, waving and straightening) that comply with contemporary requirements for quality, safety and efficacy.

Course contents:

Cosmetic products for hair washing and care – properties, types, forms; Formulation, preparation and characterization of products for: washing, care, styling, colouring, waving and straightening of hair – theoretical and practical aspects; Selection of surface active materials for shampoo formulation: surfactants vs. shampoos for everyday use, shampoos for children, anti-dandruff shampoos; Active substances in shampoos and conditioners: specific plant extracts, protein derivatives, surfactants with substantivity, oily components, moisturizers; Selection of other excipients with emphasis on antioxidants, preservatives and colorants; Choice of the containers for shampoos and conditioners; Principles of shampoos and conditioners manufacturing; Investigation of shampoo and conditioner stability, assessment of the following properties: foaming capacity, foam volume, solubilisation/washing properties; Effects exerted on volunteers' hair and skin: hair combing test, evaluation of hair shine, strength and texture, anti-dandruff effect.

Recommended literature:

1. Rosen RM. Delivery System Handbook for Personal Care and Cosmetic Products, Technology, Applications and Formulations. Norwich, New York: William Andrew Publishing, 2005.

2. Vasiljević D, Savić S, Đorđević Lj, Krajisnik D. Priručnik iz kozmetologije. Beograd: Nauka, 2009.

3. Kempler FH, Luepke P, Umbach W. Blue List Cosmetic Ingredients. Aulendorf: Editio Cantor Verlag, 2000.

4. Čajkovac M. Kozmetologija. Zagreb: Naklada Slap, 2005.

5. Rieger MM. Harry's Cosmeticology. 8th ed., New York: Chemical Publishing Co., Inc., 2000.

6. Schlossman ML. Chemistry and Manufacture of Cosmetics: Cosmetic Specialties and Ingredients, Illinois: Allured Publishing Co., 2010.

7. Review and original articles from national and international journals: Arhiv za farmaciju, International Journal of Cosmetic Science, Cosmetic&Toiletries, SÖFW Journal, Journal of Cosmetic Dermatology, Skin Research&Technology.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, laboratory work, seminars.

Grading system:

Pre-exam assignments: 30 points; exam (written): 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: In vitro/in vivo efficacy and safety studies in cosmetology

Teachers: Savić D Snežana, Antonijević M. Biljana, Vuleta M. Gordana

Course status: elective, module: Cosmetology

Semester: III	**Year of studies:** II
ECTS points: 5	**Course code:** ДКО2И5

Requirements: one-semester undergraduate course in Cosmetology; lectures in courses: Cosmetic ingredients (first semester of doctoral studies) and Formulation and characterization of cosmetic emulsions and gels (second semester of doctoral studies)

Course aims:

To introduce the candidate to design, theoretical and practical aspects of in vitro and in vivo efficacy and safety studies of cosmetic products for diverse applications, along with the selection of suitable statistical tests for analysis of the obtained results.

Course outcomes:

The candidate is capable to plan and perform in vitro and in vivo studies for efficacy and safety assessment of various cosmetic products, followed by the application of proper statistical tests for analysis of the obtained results.

Course contents:

EEMCO guidelines for the assessment of different skin parameters: skin hydration, transepidermal water loss, skin colour, mechanical properties of the skin; Clinical evaluation and skin bioengineering methodologies; Measurement of electrical properties of the skin; Measurement of transepidermal water loss; Device characteristics and study design; Methodology of the erythema and melanin index assessment; Methodology of skin pH and surface lipids content assessment; Methodology of the evaluation of skin biomechanical properties – skin viscoelasticity; Organization of the studies: short- and long-term studies, double blind, placebo controlled studies; Comparative studies; Statistical analysis of the obtained results: descriptive and analytical statistics; Parametric and non-parametric tests; Approaches of data representation and their discussion with the aim of generating relevant conclusions on the efficacy of a specific cosmetic product.

Recommended literature:

1. Baumann L. Cosmetic dermatology: Principles and Practice (1st edition in Croatian). Zagreb: Interpreta, 2011.

2. Draelos ZD. Cosmeceuticals. 1st ed., Philadelphia: Elsevier Saunders, 2005.

3. Lodén M, Maibach HI. Dry skin and moisturizers. 1st ed., Boca Raton: CRC Press, 2000.

4. Čajkovac M. Kozmetologija. Zagreb: Naklada Slap, 2000 (selected chapters).

5. Rieger MM. Harry's Cosmeticology. 8th ed., New York: Chemical Publishing Co., Inc., 2000.

6. Review and original articles from national and international journals: Arhiv za farmaciju, International Journal of Cosmetic Science, Cosmetic&Toiletries, SÖFW Journal, Journal of Cosmetic Dermatology, Skin Research&Technology.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, laboratory work, seminars.

Grading system:

Pre-exam assignments: 30 points; exam (written): 70 points.

University of Belgrade Faculty of Pharmacy	**DOCTORAL ACADEMIC STUDIES**	

Course title: Sensory assessment of cosmetic products with the applied statistics

Teachers: Savić D. Snežana, Vuleta M. Gordana

Course status: elective, module: Cosmetology

Semester: III	**Year of studies:** II
ECTS points: 5	**Course code:** ДКО2И6

Requirements: one-semester undergraduate course in Cosmetology; lectures in courses: Cosmetic ingredients (first semester of doctoral studies) and Formulation and characterization of cosmetic emulsions and gels (second semester of doctoral studies)

Course aims:

1) Comprehension of the types of sensory studies, sensory attributes and tests used in sensory evaluation of various cosmetic products;

2) Planning and conduct of sensory studies with the application of suitable statistical tests for the analysis of the obtained results.

Course outcomes:

The candidate is able to independently organize and perform sensory tests, as well as to evaluate the obtained results for diverse cosmetic products.

Course contents:

Definition of sensory attributes; Senses and cosmetic products; Descriptive sensory analysis; ASTM standards for the evaluation of various sensory properties; Recruiting panellists (selection tests/criteria for exclusion); Selection of sensory properties and panel training; Statistical analysis: panel variability and reproducibility assessment; Analysis of the results obtained in a sensory study; Development of sensory studies in correlation with instrumental measurements; Statistical tests for correlation of the results obtained through subjective sensory evaluation and physical/instrumental measurements providing parameters relating to sensory characteristics of a cosmetic product (rheological and textural analysis, measurements of the interfacial tension and contact angle a product forms on the skin...); Approaches of sensory data representation and their discussion.

Recommended literature:

1. Kemp ES, Hollowood T, and Hort J. Sensory Evaluation: A Practical Handbook. Wiley-Blackwell, A John Wiley & Sons, Ltd. Publication, UK, 2009.

2. ASTM Standard Practice for Descriptive Skinfeel Analysis of Creams and Lotions, ASTM International, Philadelphia, 2003.

3. Review and original articles from national and international journals: Journal of Sensory Studies, International Journal of Cosmetic Science, Journal of Texture Studies, Cosmetic&Toiletries, Colloid and Surface B: Biointerface.

The total of active learning classes	**Lectures:** 30
	Individual research work: 30

Teaching methods:

Lectures, seminars, laboratory work.

Grading system:

Pre-exam assignments: 30 points; exam (written): 70 points.