



**INTEGRATED ACADEMIC
STUDY OF PHARMACY**

THIRD YEAR OF STUDY

2024/2025.

BROMATOLOGY

Course unit:

Bromatology

The course is evaluated with 4 ECTS. There are 4 classes of active teaching per week (2 classes of lectures and 2 class of work in a small group).

TEACHERS:

	Name and surname	E-mail address	Title
1.	Doc. dr Dušan Lj. Tomović	dusantomovic@medf.kg.ac.rs	assistant professor
2.	Prof. dr Nela Đonović	nela@medf.kg.ac.rs	full professor
3.	Doc. dr Marija Sekulić	msekulic82@gmail.com	assistant professor

COURSE STRUCTURE:

Module	Name of module	Week	Lectures weekly	Work in small group	Teacher-head of the module
1	Introduction to nutrition and macronutrients. Micronutrients. Food groups and energy value of food. Water. Non-nutritive food ingredients.	5	2	1	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
2	Food safety. Basics of the quality system. Contamination. Pesticides and heavy metals. Additives. Items of general use.	6	2	1	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović
3	Dietary products and formulas for infants. Adverse reactions and interactions. Food labeling and statements. Legislation.	4	2	1	Doc. dr Dušan Lj. Tomović Prof. Dr Nela Đonović Doc. dr Marija Sekulić
					$\Sigma 45+30=75$

ASSESSMENT:

The student masters the course by modules. The grade is equivalent to the number of points earned (see tables). Points are earned in four ways:

PRE-EXAM ACTIVITIES

ACTIVITY DURING THE LESSON: In this way, the student can earn up to 15 points by answering 1 exam question from that week of class in the last class of work in a small group and, in accordance with the demonstrated knowledge, earns a total of 0 - 1 points.

SEMINARY PAPER (an individual written report and preparing individual Power point presentation on selected topics): In this way, the student can gain up to 20 points.

Seminary paper are written in accordance with the instructions:

1. papers should be written in English
2. font type: Times New Roman,
3. recommended number of words: 2000 words or 14000 characters
4. spacing: 1.5, alignment: both sides
5. for literature use scientific works, textbooks and other professional literature,
6. arrange references according to the Vancouver citation style
7. title page contains:
 - the name of the faculty and university,
 - school year and date of writing the seminar paper,
 - the title of the work,
 - name and surname of the student, index number
8. send the paper in electronic form to dusantomovic@medf.kg.ac.rs.

COLLOQUIUM: In this way, the student can gain up to 20 points.

FINAL EXAM

FINAL TEST: In this way, the student can earn up to 50 points, according to the attached table. In accordance with the demonstrated knowledge, the tasks on the final exam are scored from 0-1 points, at 1 points each.

MODULE		MAXIMUM POINTS		
		activity during classes		Σ
1	Introduction to nutrition and macronutrients. Micronutrients. Food groups and energy value of food. Water. Non-nutritive food ingredients.	5		5
2	Food safety. Basics of the quality system. Contamination. Pesticides and heavy metals. Additives. Items of general use.	6		6
3	Dietary products and formulas for infants. Adverse reactions and interactions. Food labeling and statements. Legislation.	4		4
Seminary paper			15	15
Colloquim			20	20
Final exam			50	50
Σ		15	85	100

The final grade is formed as follows:

In order to pass the course, the student have to obtain a minimum of 51 points and pass all modules. The final grade is formed on the basis of the number of points that can be gained on the following ways:

1. **Pre-exam activities** – Pre-exam activities are evaluated through activity during classes (15 points), seminary research paper (15 points) and one colloquium (20 points). In each of the pre-exam activities, the student must achieve more than 50 percent.
2. **Final exam** – The final exam is organized as final test and includes a check of knowledge from the overall material covered during class. In accordance with the demonstrated knowledge, in the final test, the student can achieve a maximum of 50 points.

The method of evaluation based on the points obtained is shown in the following table:

Total number of points	Description	Grade
0 - 50	Not passed	5
51 - 60	Six	6
61 - 70	Seven	7
71 - 80	Eight	8
81 - 90	Nine	9
91 - 100	Ten	10

FINAL EVALUATION

**PRE-EXAM
ACTIVITIES**

**ACTIVITY DURING
CLASSES
0-15 POINTS**

**SEMINARY PAPER
0-15 POINTS**

**COLLOQUIUM
0-20 POINTS**

FINAL EXAM

**FINAL TEST
0-50 POINTS**

LITERATURE:

module	name of the module	name of the textbook	authors	publisher	library
1	Introduction to nutrition and macronutrients. Micronutrients. Food groups and energy value of food. Water. Non-nutritive food ingredients.	Introduction to Human Nutrition (Second Edition) Editors	Gibney MJ, Lanham-New SA, Cassidy A, Vorster HH.	Wiley Blackwell Publ., 2009;	
		Food Chemistry	Belitz HD, Grosch W, Scieberle P.	Springer, 2004	
		WHO Guidelines for Drinkig Water Quality		Geneve, 2011.	
2	Food safety. Basics of the quality system. Contamination. Pesticides and heavy metals. Additives. Items of general use.	Food toxicology	Helferich W, Winter CK.	CRC Press, London, 2001.	
		Food Additives	Branen AL, Davidson PM.	CRC Press, Boca Raton, 2001.	
3	Dietary products and formulas for infants. Adverse reactions and interactions. Food labeling and statements. Legislation.	Handbook of Food-Drug Interactions	McCabe BJ, Frankel EH, Wolfe JJ.	CRC Press, London. 2003.	
		Chemical Migration and Food Contact Materials	Barnes KA, Sinclair CR, Watson DH.	Woodhead Publishing Limited, Cambridge, 2007.	

All lectures are available on the website of the Faculty of Medical Sciences: www.medf.kg.ac.rs

THE PROGRAM:

FIRST MODULE: INTRODUCTION TO NUTRITION AND MACRO NUTRIENTS. MICRO NUTRIENTS. FOOD GROUPS AND ENERGY VALUE OF FOOD. WATER. NON-NUTRITIONAL FOOD INGREDIENTS.

TEACHING UNIT 1 (FIRST WEEK):

INTRODUCTION TO NUTRITION AND MACRO NUTRIENTS

Lectures: 2 classes

Exercises: 1 class

- Introduction to nutrition and the importance of nutrition
- Proteins, their structure and importance in nutrition
- Definition, classification of lipids and importance in nutrition
- Definition, classification of carbohydrates and importance in nutrition

TEACHING UNIT 2 (SECOND WEEK):

MICRO NUTRIENTS

Lectures: 2 classes

Exercises: 1 class

- Vitamins
- Deficiency and excessive intake of vitamins
- Mineral substances
- Deficit and excessive intake of minerals

TEACHING UNIT 3 (THIRD WEEK):

FOOD GROUPS AND ENERGY VALUE OF FOOD

Lectures: 2 classes

Exercises: 1 class

- Groceries
- Energy value of food
- Calorimetry
- Energy density of food

TEACHING UNIT 4 (FOURTH WEEK):

WATER

Lectures: 2 classes

Exercises: 1 class

- Drinking water
- Conditions of health safety (hygienic correctness) of drinking water
- Microbiological parameters of drinking water analysis
- Physical and chemical parameters of drinking water analysis
- Health safety (hygienic) control of drinking water

TEACHING UNIT 5 (FIFTH WEEK):

NON-NUTRITIONAL FOOD INGREDIENTS

Lectures: 2 classes

Exercises: 1 class

- Amino acids and bioactive peptides
- Probiotics, prebiotics and synbiotics
- Enzymes and coenzymes
- Essential fatty acids
- Plant hormones
- Phytosterols and phytostanols

SECOND MODULE: FOOD SAFETY. BASICS OF THE QUALITY SYSTEM. CONTAMINATION. PESTICIDES AND HEAVY METALS. ADDITIVES. ITEMS OF GENERAL USE.

TEACHING UNIT 6 (SIXTH WEEK):

FOOD SAFETY		
Lectures: 2 classes		Exercises: 1 class
<ul style="list-style-type: none"> • Health food safety • Basic parameters of health food safety • Basics of microbiological food analysis • Basics of chemical food analysis 		

TEACHING UNIT 7 (SEVENTH WEEK):

BASICS OF THE QUALITY SYSTEM		
Lectures: 2 classes		Exercises: 1 class
<ul style="list-style-type: none"> • Quality systems • ISO 9001:2015 • ISO 17025 • HACCP • HALAL and Kosher • Risk analysis, risk management, risk assessment • Risk and profit analysis 		

TEACHING UNIT 8 (EIGHTH WEEK):

CONTAMINATION		
Lectures: 2 classes		Exercises: 1 class
<ul style="list-style-type: none"> • Antinutrients • Hormonally active substances • Antibiotics • Mushroom toxins • Mycotoxins • Microbiological contamination of food 		

TEACHING UNIT 9 (NINTH WEEK):

PESTICIDES AND HEAVY METALS		
Lectures: 2 classes		Exercises: 1 class
<ul style="list-style-type: none"> • Pesticides • Toxicological significance of pesticide residues • Toxic metals and metalloids • Polycyclic arotic hydrocarbons • Polychlorinated biphenyls, dioxins, furans 		

TEACHING UNIT 10 (TENTH WEEK):

ADDITIVES		
Lectures: 2 classes		Exercises: 1 class
<ul style="list-style-type: none">• Colors• Antioxidants• Preservatives• Sweeteners• Surfactants• Aromas• Nitrates and nitrites• Phosphates		

TEACHING UNIT 11 (ELEVENTH WEEK):

ITEMS OF GENERAL USE		
Lectures: 2 classes		Exercises: 1 class
<ul style="list-style-type: none">• Packaging• Cosmetic products• Children's toys and products intended for children and infants		

**THIRD MODULE: DIETARY PRODUCTS AND FORMULAS FOR INFANTS.
ADVERSE REACTIONS AND INTERACTIONS. FOOD LABELING AND
STATEMENTS. LEGISLATION.****TEACHING UNIT 12 (TWELFTH WEEK):**

DIETARY PRODUCTS		
Lectures: 2 classes		Exercises: 1 class
<ul style="list-style-type: none">• Definitions of dietary products• Health correctness of dietary products• Infant formulas• Food for infants and small children• International marketing code for human milk substitutes• Types of infant formula• Food for gluten intolerant• Food for special medical purposes• Definition of dietary supplements• Ingredients and health safety of dietary supplements• Phytopreparates• Functional food• Organically produced food• Nutrigenomics and nutrigenetics		

TEACHING UNIT 13 (THIRTEENTH WEEK):

ADVERSE REACTIONS AND INTERACTIONS

Lectures: 2 classes

Exercises: 1 class

- Adverse reactions to food mediated by antibodies
- Adverse reactions to food mediated by cells of the immune system
- Anaphylactoid reaction
- Metabolic disorders that cause adverse reactions to food
- Food idiosyncrasies
- The influence of nutrients on the absorption of drugs
- The influence of nutrients on drug metabolism
- The influence of medicines on the absorption of food ingredients
- Incompatibility of drugs and nutrients

TEACHING UNIT 14 (FOURTEENTH WEEK):

FOOD LABELING AND STATEMENTS

Lectures: 2 classes

Exercises: 1 class

- Declaration
- Food labeling and consumers
- Statements (nutritional and health)

TEACHING UNIT 15 (FIFTEENTH WEEK):

LEGISLATION

Lectures: 2 classes

Exercises: 1 class

- Ensuring the health and safety of food at the international level
 - Ensuring the health and safety of food in the USA
 - Ensuring food health safety in the European Union
 - Ensuring the health and safety of food in the region
 - Ensuring food health safety in the Republic of Serbia
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LESSON SCHEDULE FOR THE SUBJECT BROMATOLOGY

module	week	type	name of the lesson	teacher
1	1	L	Introduction to nutrition and the importance of nutrition. Proteins, their structure and importance in nutrition. Definition, classification of lipids and importance in nutrition. Definition, classification of carbohydrates and importance in nutrition.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
		SGW	Determination of fat, carbohydrates and proteins.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
	2	L	Vitamins. Deficiency and excessive intake of vitamins. Mineral substances. Deficiency and excessive intake of minerals.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović
		SGW	Vitamins and mineral substances.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
	3	L	Food groups. Energy value of food. Calorimetry. Energy density.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
		SGW	Energy value of food. Sugars.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić

LESSON SCHEDULE FOR THE SUBJECT BROMATOLOGY

module	week	type	name of the lesson	teacher
1	4	L	Drinking water. Conditions of health safety (hygienic correctness) of drinking water. Microbiological parameters of drinking water analysis. Physico-chemical parameters of drinking water analysis. Health safety (hygienic) control of drinking water.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović
		SGW	Drinking water. Water in the pharmacy.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
	5	L	Amino acids and bioactive peptides. Probiotics, prebiotics and synbiotics. Enzymes and coenzymes. Essential fatty acids. Plant hormones. Phytosterols and phytostanols.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
		SGW	Essential fatty acids.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
2	6	L	Health food safety. Basic parameters of health food safety. Basics of microbiological food analysis. Basics of chemical food analysis.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović
		SGW	Health food safety.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić

LESSON SCHEDULE FOR THE SUBJECT BROMATOLOGY

module	week	type	name of the lesson	teacher
2	7	L	Quality systems. ISO 9001:2015. ISO 17025. HACCP. HALAL and Kosher. Risk analysis, risk management, risk assessment. Risk and profit analysis.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
		SGW	Procedures and methods.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
	8	L	Antinutrients. Hormonally active substances. Mushroom toxins. Mycotoxins. Microbiological contamination of food.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović
		SGW	Antibiotics and mycotoxins in food.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
2	9	L	Pesticides. Toxicological significance of pesticide residues. Toxic metals and metalloids. Polycyclic arotic hydrocarbons. Polychlorinated biphenyls, dioxins, furans.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
		SGW	Methods of pesticide residue analysis in food.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić

LESSON SCHEDULE FOR THE SUBJECT BROMATOLOGY

module	week	type	name of the lesson	teacher
2	10	L	Colors. Antioxidants. Preservatives. Sweeteners. Surfactants. Aromas. Nitrates and nitrites. Phosphates.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
		SGW	Additives. Artificial colors and sweeteners.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
	11	L	Packaging. Cosmetic products. Children's toys and products intended for children and infants.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović
		SGW	Types and groups of packaging.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
3	12	L	Definitions of dietary products. Health correctness of dietary products. Infant formulas. Food for infants and small children. International Marketing Code for Human Milk Substitutes. Types of infant formula. Food for gluten intolerant. Food for special medical purposes. Definition of dietary supplements. Ingredients and health safety of dietary supplements. Phytopreparate. Functional food. Organically produced food. Nutrigenomics and nutrigenetics.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
		SGW	Definitions of dietary products. Health correctness of dietary products. Infant formulas.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić

LESSON SCHEDULE FOR THE SUBJECT BROMATOLOGY

module	week	type	name of the lesson	teacher
3	13	L	Antibody-mediated adverse reactions to food. Adverse food reactions mediated by cells of the immune system. Anaphylactoid reaction. Metabolic disorders that cause adverse reactions to food. Food idiosyncrasies. The influence of nutrients on the absorption of drugs. The influence of nutrients on drug metabolism. The influence of drugs on the absorption of food ingredients. Incompatibility of drugs and nutrients.	Doc. dr Marija Sekulić Doc. dr Dušan Lj. Tomović
		SGW	Anaphylactoid reaction. The influence of nutrients on the absorption of drugs. The influence of nutrients on drug metabolism. The influence of drugs on the absorption of food ingredients. Incompatibility of drugs and nutrients.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
3	14	L	Declaration. Food labeling and consumers. Statements (nutritional and health).	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović
		SGW	Declaration. Food labeling.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić
	15	L	Ensuring the health and safety of food at an international level. Ensuring Food Safety in the US. Ensuring food health safety in the European Union. Ensuring food health safety in the region. Ensuring food health safety in the Republic of Serbia.	Doc. dr Dušan Lj. Tomović Prof. dr Nela Đonović
3	15	SGW	Regulations of the Republic of Serbia.	Prof. dr Nela Đonović Doc. dr Dušan Lj. Tomović Doc. dr Marija Sekulić

LESSON SCHEDULE FOR THE SUBJECT BROMATOLOGY

module	week	type	name of the lesson	teacher
		SP	SEMINARY PAPER	
		COL	COLLOQUIUM	
		EX	EXAM (JANUARY-FEBRUARY TERM)	