



THIRD YEAR

2024/2025.

IMMUNOLOGY

Subject:

Immunology

The course is evaluated with 4 ECTS. There are 5 hours of active teaching per week (2 hours of lectures, 1 hour of seminar and 1 hour of work in a small group).

Teachers:

PB	Name	email	Title
1.	Ivan Jovanović	ivanjovanovic77@gmail.com	Full professor
2.	Gordana Radosavljević	perun.gr@gmail.com	Full professor
3.	Vladislav Volarević	drvolarevic@yahoo.com	Full professor
4.	Marija Milovanović	marijaposta@gmail.com	Full professor
5.	Jelena Pantić	panticjelena55@gmail.com	Full professor
6.	Sladjana Pavlović	sladjadile@gmail.com	Associate professor
7.	Aleksandar Arsenijević	aleksandar@medf.kg.ac.rs	Associate professor
8.	Ilija Jeftić	ilijamb@yahoo.com	Associate professor
9.	Nevena Gajović	gajovicnevena@yahoo.com	Assistant professor
10.	Vladimir Marković	vladimirmarkovic.vlad@gmail.com	Teaching assistant
11.	Andjela Petrović	petrovicandjela9944@gmail.com	Junior teaching assistant
12.	Isidora Stanisavljević	isidorastanisavljevic97@gmail.com	Junior teaching assistant

COURSE STRUCTURE:

Module	Name of the module	Week	Lectures weekly	Seminars per week	Work in a small group per week	Teacher
1	Immunology	15	2	1	2	Ivan Jovanovic
						$\Sigma 30+15+30=75$

EVALUATION:

The grade is equivalent to the number of points won (see tables). Points are earned in two ways:

ACTIVITY DURING THE LESSON: In this way, the student can earn up to 30 points. In order to pass the activity during the lesson, the student must obtain more than 50% of the points.

FINAL TEST: In this way, the student can gain 70 points according to the attached scheme. In order to pass the final test, the student must obtain more than 50% of the points.

FINAL TEST 0-70 points

EVALUATION OF FINAL TEST

The test has 35 questions.
Each question is worth 2 points.

The final grade is formed as follows:

In order to pass the course, the student must obtain a minimum of 51 points, pass pre-exam activities and pass the final exam (test).

number of points won	grade
0 - 50	5
51 - 60	6
61 - 70	7
71 - 80	8
81 - 90	9
91 - 100	10

LITERATURE:

the name of the textbook	authors	publisher	the library
Basic Immunology: Functions and Disorders of the Immune System, Sixth Edition	Abul K.Abbas and Andrew H. Lichtman	Datastatus, Belgrade, 2019	Has
Essentials of Clinical Immunology, 6th edition	Helen Chapel, Mansel Haeney, Siraj Misbah, Neil Snowden	Blackwell Publishing Ltd,Massachusetts, USA, 2014	Has
Case Studies in Immunology: A Clinical Companion, 7th edition	Raif Geha, Luigi Notarangelo	W. W. Norton & Company, 2021	Has
THE IL-17 CYTOKINE FAMILY IN TISSUE HOMEOSTASIS AND DISEASE	Nicola Ivan Lorè, Kong Chen and Katarzyna Bulek	Frontiers in Immunology 2021	
ISBN 978-2-88966-662-1			
Peripheral markers of immune response in major psychiatric disorders: where are we now and where do we want to be?	Błażej Misiak, Dorota Frydecka, Bartłomiej Stańczykiewicz and Jerzy Samochowiec	Frontiers 2019	
ISBN 978-2-88945-797-7			
Cytokine production in inflammatory diseases and malignancy of colon			

The presentations and accompanying document in *Word* can be found on the website of the Faculty of Medical Sciences :www.medf.kg.ac.rs

PROGRAM

Module

TEACHING UNIT 1 (FIRST WEEK)

INTRODUCTION TO IMMUNOLOGY/ CELLS AND TISSUES OF THE IMMUNE SYSTEM

Terms, Dictionary.

Innate and acquired immunity. Active and passive immunity.

Primary and secondary immune response. Phases of the immune response.

Cells of the immune system: lymphocytes, antigen-presenting cells and effector cells.

Tissues of the immune system: peripheral lymphatic organs

TEACHING UNIT 2 (SECOND WEEK)

INNATE IMMUNITY/ MOLECULAR MECHANISMS OF INFLAMMATION

Components of innate immunity; Phagocytes; NK cells.

Cytokines of the innate immune response.

The mechanism of inflammation and the stages of the inflammatory response. Mediators of acute inflammation. Migration of leukocytes.

TEACHING UNIT 3 (THIRD WEEK)

PRESENTATION OF ANTIGEN/ RECOGNITION OF ANTIGEN IN ACQUIRED IMMUNITY

Function of APCs.

Function of the MHC molecule.

Processing and presentation of protein antigens.

Antigen receptors of B- and T- lymphocytes.

Maturation and selection of lymphocytes.

TEACHING UNIT 4 (FOURTH WEEK)

CELLULAR IMMUNE RESPONSE/ EFFECTOR MECHANISMS OF CELLULAR IMMUNITY

Phases of the T-cell response.

Differentiation of naïve into effector T lymphocytes.

Types of cellular immunity.

Effector functions of helper T lymphocytes.

Effector functions of cytotoxic T lymphocytes.

TEACHING UNIT 5 (FIFTH WEEK)

HUMORAL IMMUNE RESPONSE/ EFFECTOR MECHANISMS OF HUMORAL IMMUNITY

T-dependent and T-independent humoral immune response.

Effector functions of antibodies.

Activation of the complement system.

Biological consequences of complement activation.

Hereditary deficiencies of regulatory proteins of the complement system.

TEACHING UNIT 6 (SIXTH WEEK)

IMMUNE BASIS OF ALLERGIC DISEASES. ANAPHYLAXIA AND URTICARIA/ IMMUNE BASIS OF SKIN AND RESPIRATORY SYSTEM ALLERGIES

Types of hypersensitivity.

Etiology, immunopathogenesis and immunotherapy: Anaphylaxis; Urticaria and angioedema.

Etiology, immunopathogenesis and immunotherapy of: Atopic dermatitis; Allergic conjunctivitis and rhinitis; Bronchial asthma.

TEACHING UNIT 7 (SEVENTH WEEK)

SEPSIS AND SEPTIC SHOCK/ INFLAMMATORY INTESTINAL DISEASES

Etiology and pathogenesis of sepsis and septic shock. Inflammatory mediators and regulatory cytokines in sepsis and shock. Major tissue damage.

Etiology, immunopathogenesis and immunotherapy: Crohn's disease; Ulcerative colitis.

TEACHING UNIT 8 (EIGHT WEEK)

IMMUNE TOLERANCE/AUTOIMMUNITY

Immune tolerance: Central tolerance; Peripheral tolerance.

Autoimmunity: principles and pathogenesis. Genetic factors in autoimmunity. Infection and autoimmunity. Mechanisms of tissue damage in hypersensitivity reactions.

TEACHING UNIT 9 (NINTH WEEK)

SYSTEMIC DISEASES OF JOINTS/ SYSTEMIC DISEASES OF CONNECTIVES AND MUSCLES

Etiology, immunopathogenesis and immunotherapy: Systemic lupus erythematosus; Rheumatoid arthritis

Etiology, immunopathogenesis and immunotherapy: Sjögren's syndrome; Systemic sclerosis; Polyarteritis-nodosa; Polymyositis and dermatomyositis.

TEACHING UNIT 10 (TENTH WEEK)

THE IMMUNE BASIS OF THYROID GLAND DISEASE/ THE IMMUNE BASIS OF TYPE 1 DIABETES MELLITUS

Etiology, immunopathogenesis and immunotherapy: Graves' disease; Hashimoto's thyroiditis;

Etiology and immunopathogenesis of diabetes mellitus type 1
Immunotherapy of diabetes mellitus type 1

TEACHING UNIT 11 (ELEVENTH WEEK)

**THE IMMUNE BASIS OF NEUROLOGICAL DISEASES: SCLEROSIS MULTIPLEX.
MYASTHENIA GRAVIS/ NEUROPATHIES MEDIATED BY IMMUNE MECHANISMS**

Etiology, immunopathogenesis and immunotherapy: Sclerosis multiplex; Myasthenia gravis

Etiology, immunopathogenesis and immunotherapy: Autoimmune peripheral neuropathies-Guillain-Barré syndrome, chronic inflammatory demyelinating polyneuropathy (CIDP), multifocal motor neuropathy

TEACHING UNIT 12 (TWELFTH WEEK)

**THERAPEUTIC EFFECTS OF INTRAVENOUS IMMUNOGLOBULINS/ THERAPEUTIC
EFFECTS OF CORTICOSTEROIDS AND NON-STEROID ANTI-INFLAMMATORY DRUGS**

Pharmacokinetic characteristics, mechanism of action and side effects of intravenous immunoglobulins

Pharmacokinetic characteristics, mechanism of action and side effects: Corticosteroids; Non-steroidal anti-inflammatory drugs

TEACHING UNIT 13 (THIRTEENTH WEEK)

IMMUNOMODULATORY DRUGS/ THERAPEUTIC APPLICATION OF CYTOKINES

Pharmacokinetic characteristics, mechanism of action and side effects of immunosuppressive drugs: Methotrexate; Sulfasalazine; Cyclophosphamide; Mycophenolate mofetil; Cyclosporine and tacrolimus; Thalidomide.

Application of cytokines in the treatment of: autoimmune diseases; allergic diseases; infectious diseases

TEACHING UNIT 14 (FOURTEENTH WEEK)

VACCINES/ ADVERSE EFFECTS OF VACCINATION

Definition of vaccines. Distribution of vaccines.

Side effects of vaccination: local and systemic side effects. Advantages and disadvantages of certain types of vaccines.

TEACHING UNIT 15 (FIFTEENTH WEEK)

**ANTIBODIES IN THERAPY. MONOCLONAL ANTIBODIES/ IMMUNOCONJUGATES AND
IMMUNOTOXINS**

Passive immunization: Application of antibodies in prophylaxis and therapy.

Monoclonal antibodies: Monoclonal antibody production technology; Therapeutic application of monoclonal antibodies.

Immunoconjugates. Immunotoxins

LECTURE SCHEDULE

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SCHEDULE OF PRACTICE

module	week	place	type	method unit name	teacher
	1		L/S	Introduction to immunology Cells and tissues of the immune system	Assis. prof. dr Nevena Gajovic
			P	Introduction to immunology Cells and tissues of the immune system	Dr Vladimir Markovic
	2		L/S	Innate immunity Molecular mechanisms of inflammation	Assoc. prof. dr Aleksandar Arsenijevic
			P	Innate immunity Molecular mechanisms of inflammation	Dr Andjela Petrovic
	3		L/S	Presentation of antigen Recognition of antigen in acquired immunity	Assoc. prof. dr Aleksandar Arsenijevic
			P	Presentation of antigen Recognition of antigen in acquired immunity	Dr Isidora Stanisavljevic
	4		L/S	Cellular immune response Effector mechanisms of cellular immunity	Assis. prof. dr Nevena Gajovic
			P	Cellular immune response Effector mechanisms of cellular immunity	Dr Vladimir Markovic
	5		L/S	Humoral immune response Effector mechanisms of humoral immunity	Assoc. prof. dr Jelena Pantic
			P	Humoral immune response Effector mechanisms of humoral immunity	Assoc. prof. dr Jelena Pantic
	6		L/S	Immune basis of allergic diseases. anaphylaxia and urticaria Immune basis of skin and respiratory system allergies	Assoc. prof. dr Ilija Jeftic
			P	Immune basis of allergic diseases. anaphylaxia and urticaria Immune basis of skin and respiratory system allergies	Assoc. prof. dr Ilija Jeftic
	7		L/S	Sepsis and septic shock Inflammatory intestinal diseases	Assoc. prof. dr Aleksandar Arsenijevic
			P	Sepsis and septic shock Inflammatory intestinal diseases	Dr Isidora Stanisavljevic
	8		L/S	Immune tolerance Autoimmunity	Assoc. prof. dr Aleksandar Arsenijevic

		P	Immune tolerance Autoimmunity	Dr Andjela Petrovic
9		L/S	Systemic diseases of joints Systemic diseases of connectives and muscles	Prof. dr Vladislav Volarevic
		P	Systemic diseases of joints Systemic diseases of connectives and muscles	Prof. dr Vladislav Volarevic
10		L/S	Immune basis of thyroid gland diseases Immune basis of type 1 diabetes mellitus	Assoc. prof. dr Sladjana Pavlovic
		P	Immune basis of thyroid gland diseases Immune basis of type 1 diabetes mellitus	Assoc. prof. dr Sladjana Pavlovic
11		L/S	Immune basis of neurological diseases: sclerosis multiplex, myasthenia gravis. Neuropathies mediated by immune mechanisms	Prof. dr Marija Milovanovic
		P	Immune basis of neurological diseases: sclerosis multiplex, myasthenia gravis. Neuropathies mediated by immune mechanisms	Prof. dr Marija Milovanovic
12		L/S	Therapeutic effects of intravenous immunoglobulins, corticosteroids and non-steroid anti-inflammatory drugs	Prof. dr Gordana Radosavljevic
		P	Therapeutic effects of intravenous immunoglobulins, corticosteroids and non-steroid anti-inflammatory drugs	Prof. dr Gordana Radosavljevic
13		L/S	Immunomodulatory drugs Therapeutic application of cytokines	Assoc. prof. dr Aleksandar Arsenijevic
		P	Immunomodulatory drugs Therapeutic application of cytokines	Dr Andjela Petrovic
14		L/S	Vaccines Adverse effects of vaccination	Prof. dr Ivan Jovanovic
		P	Vaccines Adverse effects of vaccination	Prof. dr Ivan Jovanovic
15		L/S	Antibodies in therapy. Monoclonal antibodies, immunoconjugates and immunotoxins	Assoc. prof. dr Aleksandar Arsenijevic
		P	Antibodies in therapy. Monoclonal antibodies, immunoconjugates and immunotoxins	Dr Isidora Stanisavljevic