



THIRD YEAR

2023/2024.

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 | Associate 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-nodosis; 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

| module | week | place | type | method unit name | teacher |
|--------|------|-------|------|---|--|
| | 1 | | L/S | Introduction to immunology Cells and tissues of the immune system | Prof. dr Gordana Radosavljevic |
| | | | P | Introduction to immunology Cells and tissues of the immune system | Dr Isidora Stanisavljevic |
| | 2 | | L/S | Innate immunity Molecular mechanisms of inflammation | Assoc. prof. dr Aleksandar Arsenijevic |
| | | | P | Innate immunity Molecular mechanisms of inflammation | Assoc. prof. dr Aleksandar Arsenijevic |
| | 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 Vladimir Markovic |
| | 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 | Assis. prof. dr Nevena Gajovic |
| | 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 Andjela Petrovic |
| | 8 | | L/S | Immune tolerance Autoimmunity | Assoc. prof. dr Aleksandar Arsenijevic |
| | | | P | Immune tolerance Autoimmunity | Dr Vladimir Markovic |
| | 9 | | L/S | Systemic diseases of joints Systemic diseases of connectives and muscles | Prof. dr Vladislav Volarevic |
| | | | P | Systemic diseases of joints | Prof. dr Vladislav Volarevic |

