2023/2024

Univerza v Mariboru

Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Ime predmeta:	Mikrobiologija z imunologijo
Course title:	Microbiology with immunology

Študijski program in stopnja **Study programme and cycle**	**Študijska smer** **Study option**	**Letnik** **Year of study**	**Semester** **Semester**
Splošna medicina, enovit magistrski študijski program		**Drugi**	**3.**
General medicine, Uniform master's degree study program		**Second**	**3rd**

Vrsta predmeta (obvezni ali izbirni) / **Course type (compulsory or elective)**	obvezni compulsory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**			**Klinične vaje** **Clinical training**	**Druge oblike študija** **Other forms of study**	**Samost. delo** **Individual work**	**ECTS**
45	30	60					75	7
		SV	**LV**	**RV**				
		15	45					

Nosilec predmeta / Course coordinator:	**prof. dr. Maja Rupnik**

Jeziki /Languages:	**Predavanja / Lectures:**	slovenski/slovene
	Vaje / Tutorial:	slovenski/slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites for enrolling in the course or for performing study obligations:**

Vsebina (kratek pregled učnega načrta):	**Content (syllabus outline):**
Skupine medicinsko pomembnih mikroorganizmov: bakterije, virusi, prioni, glive, paraziti; za vsako skupino: značilnosti, osnovna razdelitev, značilnosti patogeneze, pomembnejši predstavniki **Mikrobna patogeneza**: interakcije med mikroorganizmi in gostitelji, tipi okužb; dejavniki virulence in načini povzročanja bolezni pri različnih skupinah mikroorganizmov;	**Groups of medically important microorganisms**: bacteria, viruses, prionsn fungi, parasites; for each group: characteristics, basic division, characteristics of pathogenesis, clinical importance of major groups of clinically important pathogens **Microbial pathogenesis:** interaction between microorganisms and hosts, types of infection, factors of virulence and mechanisms of causing disease in different groups of microorganisms;

Epidemiologija nalezljivih bolezni: rezervoarji povzročiteljev in načini širjenja nalezljivih bolezni; geografsko in sezonsko pojavljanje; populacije z večjim tveganjem za nalezljive bolezni, bolnišnične okužbe; metode za tipizacijo povzročiteljev **Nadzor in obvladovanje povzročiteljev nalezljivih bolezni**: načini za nadzor širjenja nalezljivih bolezni;; cepiva; sterilizacija, razkuževanje; **Protimikrobne učinkovine in** mehanizmi delovanja in odpornosti proti kemoterapevtikom (protibakterijski, protivirusni,protiglivni, protiparazitski) **Mikrobiote**: pregled najpommebnejših mikrobiot pri človeku; vloga mikrobiote v zdravju in bolezni **Diagnostične metode za ugotavljanje povzročiteljev nalezljivih bolezni**: pravilen odvzem vzorcev za mikrobiološke preiskave; pregled diagnostike različnih kužnin; pregled različnih mikrobioloških diagnostičnih pristopov; diagnostične metode v imunologiji. **Imunologija:** zgradba imunskega sistema, naravne bariere**,** mehanizmi prirojene odpornosti; vnetje; mehanizmi pridobljene odpornosti;; imunopatogeneza; imunski odziv na okužbe (bakterijske, virusne, glivne, parazitske); prilagoditve posameznih skupin mikroorganizmov na imunski odziv.	**Epidemiology of infectious diseases:** the reservoirs of agents and manners of infectious diseases spreading; geographical and seasonal occurrence; populations with a higher risk of infectious diseases, hospital infections, methods of agent typisation; **-Methods for prevention and control of infectious diseases:** ways of monitoring the spread of infectious diseases; vaccinations, sterilisation, desinfection; **Antimicrobial agents** and mechanisms of activity and restistance to chemotherapeuticals (antibacterial, antiviral, antifunal, antiparasitic) **Microbiotas**: overview of most important microbiotas in man; the role of microbiotas in health and disease **Diagnostic methods to determine the causes of infectious diseases:** the correct taking of samples for microbiological testing; diagnost overview of different infectious material; diagnostic methods in immunology **Immunology**: the structure of the immune system; natural barriers; congenital resistanc mechanisms; inflamation; acquired resistance mechanisms, immunopathogenesis; immunal response to infection (bacterial, viral, fungal, parasitic); adaptation of individual groups of microorganisms to immunal reponse.

Temeljni literatura in viri / Reading materials:

- Ihan A (urednik) Medicinska bakteriologija z mikologijo in parazitologijo, 2020;
- Petrovec M, Poljak M. Medicinska virologija, Založba: Društvo medicinski razgledi, EAN: 9789616260183, 2011
- Ihan A. Osnove medicinske imunologije, 2022
- Murray PR, Rosenthal KS, Pfaller PA, Medical Microbiology, 9th Edition, Mosby, 2020
- Abbas A, Lichtman AH, Pillai S, Cellular and molecular immunology, 9th Edition, Elsevier, 2017

Slovenski učbeniki

Cilji in kompetence:	**Objectives and competences:**
Seznaniti študente z • osnovami klinične mikrobiologije • osnovami imunologije • pregledom diagnostičnih možnosti v klinični mikrobiologiji in imunologiji • zanesljivimi spletnimi viri informacij na področju (npr. spletne strani ECDC, CDC, WHO)	The aim is to provide up-to-date information of • basic medical microbiology • basic immunology • basic diagnostic options in clinical microbiology and immunology • information on reliably interabtional internet resources (ECDC, CDC, WHO; specific web sites)

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: našteje glavne skupine patogenih mikroorganizmov, opiše razliko med njimi glede na zgradbo in povzročanje bolezni in interakcije z imunskim sistemom	Knowledge and understanding: The student lists major groups of pathogenic microorganisms; decribes the difference between them based on the structure and causing of disease and

pozna najpomembnejše predstavnike vsake skupine mikroorganizmov, njihove značilnosti, dejavnike virulence, posebnosti, bolezni s katerimi je povezan, način mikrobiološke diagnostike in zdravljenja našteje mehanizme mikrobne patogeneze, zna opisati dejavnike virulence in njihovo vlogo pri nastanku bolezni opiše zgradbo imunskega sistema in mehanizme, ki sodelujejo v imunosti; pozna glavne tipe imunskih celic, zna našteti njihove razvojne stopnje ter njihovo vlogo v imunskem odzivu. razloži potek imunskega odziva na okužbe in povezavo s prilagoditvami mikroorganizmov poveže prekomerno, škodljivo delovanje imunskega sistema z bolezenskimi znaki zna opisati načine za preprečevanje in omejevanje okužb, njihovo uporabo in pomen našteje metode, ki se uporabljajo v mikrobiološki diagnostiki in razume tipe in odvzem kužnin pozna najpomembnejše mikrobiote, njihove predstavnike in vlogo v zdravju in bolezni Prenesljive/ključne spretnosti in drugi atributi: - sposobnost samostojnega dela - sposobnost povezovanja z drugimi učnimi vsebinami - uporaba primarnih virov literature	interaction with the immune system; knows the most important representatives of each group of microorganisms, their characteristics, factors of virulence, specific features, diseases with which it's connected, ways of microbiological diagnostics and treatment; lists the mechanisms of microbial pathogenesis; knows to describe the factors of virulence and their role in the occurrence of disease, Describes the structure of immune system and mechanisms that have a role in immunity; knows the main types of immune cells; knows their developmental stages and their role in immune response. Explains the course of immune response to infections and the connection with adaptations of microorganisms Connects excessive, harmful activity of the immune system with pathological signs; Describes the ways for preventing and limiting infection, their use and meaning; Lists methods used in microbiological diagnostics and understands the types and the taking of infectious materials; Knows the most important microbiota, their representatives and their role in health in diseases Transferable/Key Skills and other attributes: - capability of independent work - capability of connecting the microbiological topics with other subjects - use of primary sources of scientific literature

Metode poučevanja in učenja:	**Learning and teaching methods:**
predavanja, seminarska diskusija (seminar in seminarske vaje), laboratorijske vaje (lahko vključujejo tudi kratke individualne projektne naloge);	lectures, discussions in smaller groups during seminars and tutorials, laboratory exercises (optionally includes also short individual projects);

Načini ocenjevanja:	Delež (v %) / Share (in %)	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) ŠTUDIJSKE OBVEZNOSTI ŠTUDENTOV Predavanja so obvezna v 30% deležu, seminarji v 20% deležu, seminarske vaje v 80% deležu in vaje v 90% deležu (na vajah se sproti preverja znanje teoretično znanje aktualne in preteklih vaj) Seminarskih nalog ni PREVERJANJE ZNANJA je sestavljeno iz kolokvija in pisnega izpita.		Type (examination, oral, coursework, project): ACADEMIC OBLIGATIONS OF STUDENTS: Attendance is obligatory: 30% for lectures, 20% for seminars, 80% for seminar exercises and 90% for practical laboratory exercises (student must be familiar with theoretical basis for current and of previous exercises) Written or oral seminars are not a requirement ASSESSMENT METHOD is comprised of colloquium and written exam.

Pogoj za pristop k posameznemu preverjanju znanja: Opravljeni zaključni kolokvij pri vajah je pogoj za pristop k pisnemu delu izpita Opravljen kolokvij – 10% delni kolokvij, 25% zaključni kolokvij Pisni del izpita – 65%	 **35%** **65%**	REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING: Passed exam for practical exercises (colloquium) is a requirement for written exam colloqium – 10% partial colloquium, 25% final colloquium written exam 65%

Reference nosilca / Course coordinator's references:

JANEŽIČ, Sandra, BLAŽEVIČ, Ines, EYRE, David, KOTNIK-KEVORKIJAN, Božena, REMEC-ZAFRED, Tatjana, **RUPNIK, Maja**. Possible contribution of shoes to Clostridioides difficile transmission within hospitals. Clinical microbiology and infection. [Online ed.]. May **2021**, vol. 27, issue 5, 797-799. ISSN 1469-0691. https://www.sciencedirect.com/science/article/abs/pii/S1198743X20306911?via%3Dihub, DOI: 10.1016/j.cmi.2020.11.001. [COBISS.SI-ID 42661635], [JCR, SNIP, WoS do 9. 8. 2021: št. citatov (TC): 1, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0,00, Scopus do 10. 8. 2022: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0,17], kategorija: 1A1 (Z, A'', A', A1/2)

JANEŽIČ, Sandra, **RUPNIK, Maja**. Development and implementation of whole genome sequencing-based typing schemes for Clostridioides difficile. Frontiers in public health. Oct. **2019**, vol. 7, article 309, str. 1-7. ISSN 2296-2565. https://www.frontiersin.org/articles/10.3389/fpubh.2019.00309/full, DOI: 10.3389/fpubh.2019.00309. [COBISS.SI-ID 512940088], [JCR, SNIP, WoS do 30. 6. 2022: št. citatov (TC): 14, čistih citatov (CI): 13, čistih citatov na avtorja (CIAu): 6,50, Scopus do 16. 7. 2022: št. citatov (TC): 15, čistih citatov (CI): 13, čistih citatov na avtorja (CIAu): 6,50], kategorija: 1A1 (Z, A', A1/2);

MAHNIČ, Aleksander, AUCHTUNG, Jennifer, POKLAR ULRIH, Nataša, BRITTON, Robert A., **RUPNIK, Maja**. Microbiota in vitro modulated with polyphenols shows decreased colonization resistance against Clostridioides difficile but can neutralize cytotoxicity. Scientific reports. **2020**, vol. 10, no. 8358, 1-11 str., ilustr. ISSN 2045-2322. https://www.nature.com/articles/s41598-020-65253-0, DOI: 10.1038/s41598-020-65253-0. [COBISS.SI-ID 16205827], [JCR, SNIP, WoS do 27. 7. 2022: št. citatov (TC): 4, čistih citatov (CI): 4, čistih citatov na avtorja (CIAu): 0,80, Scopus do 15. 5. 2022: št. citatov (TC): 4, čistih citatov (CI): 4, čistih citatov na avtorja (CIAu): 0,80], kategorija: 1A1 (Z, A', A1/2)

MAHNIČ, Aleksander, BRESKVAR, Martin, DŽEROSKI, Sašo, SKOK, Pavel, PINTAR, Špela, **RUPNIK, Maja**. Distinct types of gut microbiota dysbiosis in hospitalized gastroenterological patients are disease non-related and characterized with the predominance of either Enterobacteriaceae or Enterococcus. Frontiers in microbiology. Feb. **2020**, vol. 11, str. 1-10, ilustr. ISSN 1664-302X. https://www.frontiersin.org/articles/10.3389/fmicb.2020.00120/full, DOI: 10.3389/fmicb.2020.00120. [COBISS.SI-ID 33165351], [JCR, SNIP, WoS do 17. 8. 2022: št. citatov (TC): 12, čistih citatov (CI): 12, čistih citatov na avtorja (CIAu): 2,00, Scopus do 24. 8. 2022: št. citatov (TC): 14, čistih citatov (CI): 14, čistih citatov na avtorja (CIAu): 2,33], kategorija: 1A1 (Z, A', A1/2);

TKALEC, Valerija, VIPREY, Virginie, DAVIS, Georgina L, JANEŽIČ, Sandra, SENTE, Béatrice, DEVOS, Nathalie, WILCOX, Mark, DAVIES, Kerrie, **RUPNIK, Maja**. Clostridioides difficile positivity rate and PCR ribotype distribution on retail potatoes in 12 European countries, January to June 2018. Eurosurveillance. [Online ed.]. **2022**, vol. 27, no. 15, str. 1-10. ISSN 1560-7917. https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2022.27.15.2100417, DOI: 10.2807/1560-7917.ES.2022.27.15.2100417. [COBISS.SI-ID 105165315], [JCR, SNIP, Scopus], kategorija: 1A1 (Z, A', A1/2)