2025/2026

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Ime predmeta:	Anesteziologija in obravnava bolečine
Course title:	Anaesthesiology and pain management

Študijski program in stopnja Study programme and cycle	Študijska smer Study option	Letnik Year of study	Semester Semester
Splošna medicina, enovit magistrski študijski program		Četrti	8.
General medicine, Uniform master's degree study program		Fourth	8th

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
		AV	LV	RV				
20	20				20		60	4

Nosilec predmeta / Course coordinator:	**red. prof. dr. Mirt Kamenik**
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):
Priprava bolnika na anestezijo, pomen spremljajočih bolezni. Anestezijski dihalni sistemi in anestezijski aparat. Splošna anestezija: inhalacijski anestetiki, intravenski anestetiki, opijati in mišični relaksansi. Splošna anestezija – postopki. Nadzor bolnika med anestezijo. Področna anestezija (subarahnoidna anestezija, epiduralna anestezija, intravenski blok, blokade živčnih pletežev). Nadomeščanje tekočin. Zapleti med anestezijo in po anesteziji. Dodatni postopki oživljanja. Enota intenzivne terapije - obseg dela in indikacije za sprejem. Zdravljenje s kisikom, umetna ventilacija indikacije in načini predihavanja.	Preparation of the patient for anaesthesia, the impact of concurrent disease. Anaesthesia breading circuits and the anaesthesia machine. General anaesthesia: inhalational anaesthetics, intravenous anaesthetics, opioids and muscle relaxants. Monitoring during anaesthesia. Regional anaesthesia (spinal anaesthesia, epidural anaesthesia, intravenous block, peripheral plexus block). Fluid management. Complications during and after anaesthesia. Advanced life support. Postoperative pain and methods for postoperative pain relief. Intensive care unit – the magnitude of work and indications for patient acceptance. Oxygen therapy, mechanical ventilation – indications and moods of ventilation.

Fiziologija in psihologija bolečine. Anamneza in pregled bolnika z bolečino. Akutna bolečina, pooperativna bolečina; vrste in načini zdravljenja. Vrste bolečine in metode zdravljenja kronične bolečine: bolečina zaradi raka, nevropatska bolečina, kronična bolečina, ki ni posledica raka.	Physiology and psychology of pain. Anamnesis and examination of a patient with pain. Acute pain, postoperative pain; types and modes of treatment. Types of pain and treatment methods of chronical pain: pain due to cancer, neuropathic pain, chronical pain which is not a consequence of cancer.

Temeljni literatura in viri / Reading materials:

TEMELJNI VIRI

- Jesse M. Ehrenfeld JM, Urman RD, Segal BS (Eds). Anesthesia Student Survival Guide: A Case-Based Approach 3rd ed. 2022 Edition, Springer Nature Switzerland AG 2022.
- Cheng J, Rosenquist RW. (Eds.). Fundamentals of Pain Medicine 1st ed. 2018 Edition, Springer International Publishing AG 2018.

DODATNI VIRI

- European Resuscitation Council Guidelines 2021. ERC Guidelines (cprguidelines.eu)
- Novak Jankovič V in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine. **Modul 1**, Splošna anestezija 1. Ljubljana: Medicinski simulacijski center, Univerzitetni klinični center: Katedra za anesteziologijo in reanimatologijo, Medicinska fakulteta, 2022. (https://www.szaim.org/wp-content/uploads/2021/03/Modul1-zbornik-2022.pdf).
- Mekiš D in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine. **Modul 2**, Splošna anestezija 2. Maribor: UKC, Oddelek za anesteziologijo, intenzivno terapijo in terapijo bolečin, 2022. (https://www.ukc-mb.si/strokovna-sre%C4%8Danja/zborniki).
- Zdravkovič M in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine, **Modul 3**: Temeljni in dodatni postopki oživljanja otrok in odraslih; Maribor: UKC, Oddelek za anesteziologijo, intenzivno terapijo in terapijo bolečin , 2022. (https://www.szaim.org/wp-content/uploads/2021/03/Ucbenik-modul3-koncna-november-2022.pdf).
- Markovič Božič J in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine. **Modul 4**, Splošna anestezija 3. Ljubljana: Klinični oddelek za anesteziologijo in intenzivno terapijo operativnih strok, Kirurška klinika, Univerzitetni klinični center ; Maribor : Oddelek za anesteziologijo, intenzivno terapijo in terapijo bolečin, Univerzitetni klinični center, 2019. (https://www.szaim.org/wp-content/uploads/2021/03/Modul4-zbornik.pdf).
- Poredoš P in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine. **Modul 5**, Področna anestezija. Ljubljana : Klinični oddelek za anesteziologijo in intenzivno terapijo operativnih strok, Kirurška klinika, Univerzitetni klinični center, 2020. (https://www.szaim.org/wp-content/uploads/2021/03/Modul5-zbornik.pdf).
- Šoštarič M in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine. **Modul 6**, "Kardiotorakalna anestezija". Ljubljana: Medicinski simulacijski center, Univerzitetni klinični center: Katedra za anesteziologijo in reanimatologijo, Medicinska fakulteta, 2021. (http://www.szaim.org/datoteke/Eucbenik-6modul.pdf).
- Potočnik I in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine. **Modul 7**, "Specialna anestezija 2". Ljubljana: Onkološki inštitut Ljubljana, 2021. (http://www.szaim.org/datoteke/Eucbenik-7modul.pdf).
- Kamenik M in sod. Šola anesteziologije, reanimatologije in perioperativne intenzivne medicine. **Modul 8**, "Specialna anestezija 3". Maribor: Univerzitetni klinični center : Medicinska fakulteta, 2021. (https://www.ukc-mb.si/strokovna-sre%C4%8Danja/zborniki).

Cilji in kompetence:	**Objectives and competences:**
Seznaniti študenta medicine z področji dela anesteziologa (anestezija, perioperativna intenzivna terapija in terapija bolečine). Študent spozna pomen	To give the student an information about the field of work of an anaesthesiologist (anaesthesia, intensive care and pain therapy). The students will get the knowledge

priprave bolnika na operacijo, delovanje anestetikov, izpeljavo vseh faz anestezije, vrednotenje podatkov neinvazivnega in invazivnega monitoringa, spozna ukrepe zdravljenja v enoti intenzivne terapije, Ponovi temeljne in osvoji dodatne postopke oživljanja. Pridobiti osnovno znanje in veščine za diagnosticiranje in zdravljenje bolečine. Študent bo sposoben opraviti pregled bolnika z boleči no in jo opredeliti po vzroku, patofiziologiji, lokalizaciji in trajanju. Študent bo lahko ocenil bolečino, razumel njen vpliv na kakovost življenja bolnika in bo sposoben oceniti kateri načini zdravljenja so primerni za določeno vrsto bolečino. Študent se seznani z racionalnim načinom uporabe opijatov pri zdravljenju akutne in kronične bolečine, ter z drugimi metodami zdravljenja bolečine.	about the preparation of the patient for surgery, the mechanism of action of anaesthetics, management of anaesthesia, invasive and non-invasive monitoring during anaesthesia and in the intensive care, the methods of treatment of critically ill patients. The students will learn the methods of basic and advanced life support. Acquiring basic knowledge and skills for diagnosing and treatment of pain. A student will be able to examine a patient with pain and identify pain according to its cause, pathophysiology, localization and duration. A student will be able to assess pain, understand its influence on the quality of a patient's life and will be able to assess which modes of treatment are appropriate for a certain type of pain. A student is acquainted with rational mode of the use of opiates in the treatment of acute and chronical pain and with other methods of pain treatment.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Predoperativni pregled in priprava bolnika na operacijo Oskrba dihalne poti in algoritem za težko intubacijo Dodatni postopki oživljanja odraslega in otroka Anestezijski dihalni sistemi in anestezijski aparat Inhalacijski anestetiki, intravenski anestetiki, opijatni analgetiki, mišični relaksanti, lokalni anestetiki Venski dostop in nadomeščanje tekočin med anestezijo Področna anestezija (spinalna anestezija, epiduralna anestezija, blokade pletežev, intravenska področna anestezija) Rutinski in invazivni nadzor obtočil med anestezijo Nadzor dihalnih plinov, mišične relaksacije in spanja med anestezijo Zapleti med anestezijo in po anesteziji Anestezija pri bolniku z boleznijo srca Intenzivna terapija (postopki, indikacije za sprejem) Zdravljenje s kisikom in ocena plinske analize arterijske krvi Uporaba vazoativnih učinkovin Študenti bodo spoznali pomen celostne obravnave bolnika z bolečino. Sposobni bodo pri bolniku ugotoviti vrsto in oceniti intenziteto bolečine, razumeti vpliv bolečine na kakovosti življenja. Študenti bodo usposobljeni uporabiti osnovne metode analgezije za doseganje učinkovite kontrole bolečine, klasificirati metode izbirnega zdravljenja po stopnjevalni shemi in oceniti učinkovitost zdravljenje bolečine. Delno bodo študenti usposobljeni za prepoznavanje in osnovno specifično obravnavo: akutne bolečine po poškodbi in operaciji, bolečine zaradi raka, nevropatske bolečine in kronične bolečine, ki ni posledica raka. Prenesljive/ključne spretnosti in drugi atributi: **Veščine:**	**Knowledge and Understanding:** Preoperative visit and the preparation of the patient for surgery. Airway management and difficult airway algorithm Adult and paediatric advanced life support Anaesthesia breading circuits and the anaesthesia machine Inhalational anaesthetics, intravenous anaesthetics, opioids, muscle relaxants, local anaesthetics Venous access and fluid management during anaesthesia Regional anaesthesia (spinal anaesthesia, epidural anaesthesia, plexus blockade, intravenous regional anaesthesia) Invasive and non-invasive cardiovascular monitoring during anaesthesia. Monitoring of exhaled gasses, muscle relaxation and sleep during anaesthesia Complications during and after anaesthesia Anaesthesia in the patient with concurrent heart disease Intensive care (treatment methods and indications for patient acceptance in the ICU) Oxygen therapy and blood gas analysis The use of vasoactive substances Students will be acquainted with the meaning of comprehensive treatment of a patient with pain. They will be able to identify the type of pain in a patient and assess the intensity of pain, understand the influence of pain on the quality of life. Students will be qualified to use basic methods of analgesia for the achievement of efficient pain control, classify methods of optional treatment according to a graded scheme and assess efficiency of pain treatment. Students will be partially qualified for the recognition and basic specific treatment: of acute pain after injury and operation, of pain due to cancer, of neuropathic pain and of chronical pain that is not a consequence of cancer.

Predihavanje z dihalno masko in uporaba ročnega dihalnega balona Uporaba orofaringealnega tubusa, laringealne maske in orotrahealna intubacija Vstavitev venske kanile Odmerjanje zdravil med oživljanjem Defibrilacija s polavtomatskim in klasičnim defibrilatorjem Merjenje osrednjega venskega tlaka Nekrvavo in krvavo merjenje krvnega tlaka Vrednotenje pulznega oksimetra, kapnografije in plinske analize arterijske krvi Faze splošne anestezije (uvod, vzdrževanje, zbujanje) Spinalna in epiduralna anestezija anestezija Uporaba kisikove jeklenke in prenosnega ventilatorja Priprava in redčenje zdravil Priprava in menjava infuzijske raztopin Ocenjevanje vrste in intenzitete bolečine Predpisovanje neopijatnijh in opijatnih analgetikov Pomen področnih tehnik v zdravljenju akutne in kronične bolečine. Ocenjevanje uspešnosti zdravljenja bolečine	Transferable/Key Skills and other attributes: **Key Skills:** Artificial ventilation using a face mask and a self-inflating bag The use of oropharyngeal tube, laryngeal mask and orotracheal tube Intravenous line placement Use of drugs during resuscitation Defibrillation using an automatic or classical defibrillator Measurement of central venous pressure Invasive and non-invasive blood pressure measurement The use of the pulse oxymeter, capnography and blood- gas analysis General anaesthesia (induction, maintenance, awakening) Spinal and epidural anaesthesia The use of oxygen bottle and the use of a transport ventilator Preparation of the drugs Preparation and the exchange of intravenous fluid bottles Assessment of type and intensity of pain. Prescribing non-opiate and opiate analgesics. Meaning of field techniques in the treatment of acute and chronical pain. Success assessment of pain treatment.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Seminarji Praktične vaje Vaje na simulatorju	Lectures Seminars Practical training Simulator training

Načini ocenjevanja:	Delež (v %) / Share (in %)	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) ŠTUDIJSKE OBVEZNOSTI ŠTUDENTOV • Obvezna prisotnost na seminarjih • Obvezna prisotnost na vajah • Prisotnost na predavanjih vsaj 50% POGOJI ZA PRISTOP K POSAMEZNEMU PREVERJANJU ZNANJA Opravljene študijske obveznosti: - vaje - seminarji - predavanja - 50% prisotnost Pisni izpit Ustni izpit	 **80** **20**	Method (written or oral exam, coursework, project): ACADEMIC OBLIGATIONS OF STUDENTS Obligatory attendance at coursework Obligatory attendance at laboratory work Attendance at lectures at least 50% REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING Completed academic obligations: - laboratory work - coursework - lectures – 50% attendance Written exam Oral exam

Reference nosilca / Course coordinator's references:

1. OSOJNIK, Irena, KAMENIK, Mirt. The effect of diclofenac on bleeding, platelet function, and consumption of opioids following cardiac surgery. *Brazilian Journal of Cardiovascular Surgery*. 2020, vol. 35, iss. 2, str. 160-168, ilustr. ISSN 1678-9741. http://www.bjcvs.org/pdf/3367/v35n2a09.pdf, DOI: 10.21470/1678-9741-2019-0283. [COBISS.SI-ID 6964543], [JCR, SNIP, WoS, Scopus]

2. ZDRAVKOVIĆ, Marko, KAMENIK, Mirt. A prospective randomized controlled study of combined spinal-general anesthesia vs. general anesthesia for laparoscopic gynecological surgery : opioid sparing properties. *Journal of clinical anesthesia*. Sep. 2020, vol. 64, str. 1-8, ilustr. ISSN 1873-4529. https://www.sciencedirect.com/science/article/pii/S0952818020300908# , https://doi.org/10.1016/j.jclinane.2020.109808, DOI: 10.1016/j.jclinane.2020.109808. [COBISS.SI-ID 6985023], [JCR, SNIP, WoS do 14. 4. 2023: št. citatov (TC): 8, čistih citatov (CI): 8, čistih citatov na avtorja (CIAu): 4,00, Scopus do 8. 4. 2023: št. citatov (TC): 8, čistih citatov (CI): 8, čistih citatov na avtorja (CIAu): 4,00]

3. ZDRAVKOVIĆ, Marko, PODBREGAR, Matej, KAMENIK, Mirt. Near-infrared spectroscopy for assessing microcirculation during laparoscopic gynaecological surgery under combined spinal-general anaesthesia or general anaesthesia alone : a randomised controlled trial. *Journal of clinical monitoring and computing*. Oct. 2020, vol. 34, issue 5, str. 943-953, ilustr. ISSN 1573-2614. https://link.springer.com/article/10.1007%2Fs10877-019-00406-9, DOI: 10.1007/s10877-019-00406-9. [COBISS.SI-ID 6814015], [JCR, SNIP, WoS do 12. 12. 2022: št. citatov (TC): 6, čistih citatov (CI): 5, čistih citatov na avtorja (CIAu): 1,67, Scopus do 23. 11. 2022: št. citatov (TC): 7, čistih citatov (CI): 6, čistih citatov na avtorja (CIAu): 2,00]

4. ŽUNIĆ, Miodrag, KRČEVSKI-ŠKVARČ, Nevenka, KAMENIK, Mirt. The influence of the infusion of ephedrine and phenylephrine on the hemodynamic stability after subarachnoid anesthesia in senior adults : a controlled randomized trial. *BMC anesthesiology*. 2019, vol. 19, str. [1]-8, ilustr. ISSN 1471-2253. https://bmcanesthesiol.biomedcentral.com/articles/10.1186/s12871-019-0878-4, DOI: 10.1186/s12871-019-0878-4. [COBISS.SI-ID 6870591], [JCR, SNIP, WoS do 23. 11. 2022: št. citatov (TC): 3, čistih citatov (CI): 3, čistih citatov na avtorja (CIAu): 1,00, Scopus do 13. 12. 2022: št. citatov (TC): 4, čistih citatov (CI): 4, čistih citatov na avtorja (CIAu): 1,33]