UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	ČLOVEK IN OKOLJE
COURSE TITLE:	MAN AND ENVIRONMENT

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Varstvo okolja in ekotehnologije, 1. stopnja	/	1.	2.
Environmental Protection and Eco-technologies, 1st level	/	1st	2nd

Vrsta predmeta / Course type	Obvezni predmet / Obligatory subject
Univerzitetna koda predmeta / University course code:	ČO

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
60	/	30	/	15	120	8

Nosilec predmeta / Lecturer:	viš. pred. dr. Anja Bubik, Katrin Školnik Škrabe, mag. / Anja Bubik, Ph.D., Lecturer, Katrin Školnik Škrabe, M.sc.

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski / Slovenian
	Vaje / Tutorial:	Slovenski / Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Pogojev ni.	No formal prerequisites.

Vsebina:	**Content (Syllabus outline):**
1) ZEMLJA KOT SISTEM: • **Uvod:** splošna predstavitev predmeta, namen in cilji ter pregled vsebin • **Kritičen odnos do okolja:** znanstveni, kritičen pristop k prepoznavanju okoljskih problemov in iskanju rešitev • **Sistemi, ekosistemi:** osnove, pravila in koncepti sistemov, spremembe v sistemih, pozitivna in negativna povrtana zanka, Zemlja kot sistem • **Biološka produktivnost in energijski pretok:** produkcija v sistemih, pretok energije, zakoni in pogoji za delovanje sistema • **Biološka raznovrstnost:** osnove, razvoj sistemov, evolucija, genetska/vrstna/okoljska raznovrstnost, ekološke niše • **Ekološka obnova:** obnova sistema, povratne zanke, samoobnova in načrtna obnova sistema • **Biogeokemijsko kroženje v sistemu**: življenje in globalno kemijsko kroženje, biogeokemijsko kroženje osnovnih organskih gradnikov	**1) EARTH AS A SYSTEM** • **Key Themes in Environmental Science:** general presentation of the course, purpose and objectives and content overview • **Critical Thinking about the Environment:** a scientific and critical approach to environmental problems and finding solutions • **Systems, Ecosystems**: basic system concepts and fundamentals, positive and negative feedback, Earth as a system • **Biological Production and Ecosystem Energy Flow:** biological production and biomass in the system, energy flow and the laws of thermodynamics • **Biological Diversity**: basics, systems development, biological evolution, genetic/species/environmental diversity, ecological niches • **Ecological Restoration:** system restoration, feedback, natural restoration and restoration projects

2) PREBIVALSTVO IN OKOLJE:

- **Populacije v sistemih in njihove spremembe:** eksponentna rast prebivalstva, nosilna kapaciteta sistemov, distribucija in limita prebivalstva v prihodnosti, rastne krivulje, spremembe in omejitveni faktorji
- **Malthusova teorija in politični programi načrtovanja družin:** Malthusove hipoteze – pregled in analiza, pregled demografskih sprememb in politik po svetu, politika enega otroka – vzroki in posledice
- **Proizvodnja zadostne količine hrane:** produkcija hrane v sistemu, proizvodnja hrane na Zemlji v povezavi z demografskimi spremembami
- **Vpliv kmetijstva na sisteme:** vplivi povečane produkcije hrane na sisteme
- **Gensko spremenjeni organizmi:** osnove, biotehnologija, GSO kot hrana, GSO kot zdravila, rešitev ali skrb, raziskave
- **Samooskrba in trajnost v sistemu:** zagotavljanje samooskrbe in trajnosti v sistemu

3) RABA VODNIH VIROV

- **Pomen vode v sistemih:** globalen pogled na vodo v sistemih – lastnosti, oblike, razporejenost, dostopnost, vloga za sistem in človeka
- **Oskrba z vodo:** pomen vode za življenje, vodni management
- **Uporaba in upravljanje z vodnimi viri v sistemih:** odnos človeka do vodnih virov, pomen in izkoriščanje vode v sistemih
- **Mokrišča:** primer naravnih in antropogenih vodnih virov
- **Onesnaženje vodnih virov:** vpliv človeških aktivnosti na kvaliteto vode – viri in vzroki, kategorije onesnažil (splošno)

4) OKOLJSKI PROBLEMI

- **Podnebne spremembe in segrevanje ozračja:** opis, vzroki, posledice, trendi in možne rešitve
- **Širjenje puščav in izguba rodovitnih tal:** opis, vzroki, posledice, trendi in možne rešitve
- **Izsekavanje gozdov:** opis, vzroki, posledice, trendi in možne rešitve
- **Izguba biotske pestrosti:** opis, vzroki, posledice, trendi in možne rešitve
- **Okoljski problemi morja in celinskih voda:** opis okoljskih problemov morja (izlitje nafte, odplake, vnos invazivk, prelov, onesnaženje s plastiko), vzroki, rešitve in primeri
- **Okoljski problemi zrak**: opis (tanjšanje ozonske plasti, prašni delci, SO2 in NOx, troposferski ozon), vzroki, posledice, trendi in možne rešitve

- **The Biogeochemical Cycles:** life and global chemical cycles, general aspects of biogeochemical cycles

2) THE HUMAN POPULATION AND THE ENVIRONMENT

- **Basic Concepts of Population Dynamics in the Systems:** exponential growth, carrying capacity of systems, analyzing and estimating future population growth, growth curves, changes and limiting factors
- **Malthus Theory and Population Policy:** Malthus hypothesis - overview and analysis, overview of demographic changes and policies around the world, One-child policy - causes and consequences
- **Food Production:** food production in the system, food production and demographic changes
- **An Ecological Perspective on Agriculture:** effects of increased food production on systems
- **Genetically Modified Organisms**: basics, GMOs as food and medicines, solution or care, research cases
- **Self-supply and Sustainability in the System:** ensuring self-supply and sustainability in the system

3) USE OF WATER

- **The Role of Water in the Environment:** a global view - properties, shapes, distribution, supply and use of water
- **Water Supply:** the role of water for population, water management
- **Water Use and Management:** the relationship between human and water resources, the importance and exploitation of water in systems
- **Wetlands:** an example of natural and anthropogenic aquatic resources
- **Water Pollution**: the impact of human activities on the quality of water - sources and causes, categories of pollutants (basics)

4) ENVIRONMENTAL PROBLEMS

- **Climate change and warming of the atmosphere**: a description, causes, consequences, trends and possible solutions
- **Desertification and loss of fertile soil**: description, causes, consequences, trends and possible solutions
- **Deforestation:** description, causes, consequences, trends and possible solutions
- **Loss of biodiversity**: a description, causes, consequences, trends and possible solutions

• **Kmetijstvo in vplivi na okolje:** opis (pesticidi, gnojila, izpusti metana, gensko siromašenje, poraba vode, itd.), posledice in rešitve • **Izpostavljenost ljudi onesnažilom in okoljske nesreče:** izpostavljenost ljudi onesnažilom (svinec, kadmij, PAHi, azbest, PCB, itd.) in učinki na zdravje, varstvo in preprečevanje; primeri okoljskih nesreč	• **Environmental problems affecting the oceans and inland waters**: a description of the environmental problems of the sea (oil spillage, sewage, invasions, overfishing, pollution with plastics), causes, solutions and examples • **Air pollution**: description (ozone depletion, dust particles, SO_2 and NO_x, tropospheric ozone), causes, consequences, trends and possible solutions • **Environmental impacts of agriculture**: description (pesticides, fertilizers, methane emissions, gene poverty, water consumption, etc.), implications and solutions • **Human exposure to pollutants and environmental disaster**: exposure of humans to pollutants (lead, cadmium, PAHs, asbestos, PCBs, etc.) and health effects, protection and prevention; some of the worst environmental disasters caused by humans

Temeljna literatura in viri / Textbooks:

- D. Botkin, E. Keller: Environmental Science: : Earth as a Living Planet, Wiley, New York, 6th Edition, 2007
- D. Botkin, E. Keller: Environmental Science: Earth as a Living Planet, Wiley, New York, 9th Edition, 2011
- Zupančič Justin M., 2010. Uvod v okoljske tehnologije. Visokošolski učbenik pri predmetu Uvod v okoljske tehnologije. Visoka šola za varstvo okolja, Limnos. Velenje, Ljubljana.
- Lanz T., 2015. Global Environmental Problems: Causes, Consequences, and Potential Solutions. Cognella.

Cilji in kompetence:	**Objectives and competences:**
• Seznanitev z interdisciplinarno naravo problematike okolja, kjer se potrebe človeka po hrani, energiji in surovinah prepletajo s posledicami izkoriščanja naravnih virov. • Razumevanje okoljskih problemov in razvoj kritičnega mišljenja do okoljskih problemov, ki se posledica delovanja družbe in njenih vse večjih potreb po rabi naravnih virov. • Razvoj rešitev za ustrezno upravljanje z ekosistemi s predlaganimi interdisciplinarnimi ukrepi za varovanje okolja. • Spodbujanje k refleksiji aktualnega dogajanja na področju okoljskih problemov, vezanega na družbo in njene spremembe.	• Introduction to the interdisciplinary nature of environmental problems, where human needs for food, energy and raw materials are connected to the consequences of the extensive use of natural resources. • Understanding of environmental problems and development of critical thinking about environmental problems, which occur as result of social dynamic and its increased needs for natural resources use. • Development of solutions for proper ecosystem management using interdisciplinary measures for environment protection. • Encouraging the reflection of current environmental issues, related to social dynamics.

Predvideni študijski rezultati:	**Intended learning outcomes:**

Znanje in razumevanje:	**Knowledge and understanding:**
Študent: • definira osnovne pojme, vezane na ekosisteme in vplive družbe nanj • prepozna človekove potrebe po izkoriščanju naravnih virov, predvidi potencialne posledice ter predlaga ustrezne rešitve • opiše glavne okoljske probleme • razume vzroke in posledice okoljskih problemov • pojasni primere okoljskih problemov v domačem in tujem okolju	Student: • defines basic concepts related to ecosystems and social impact on them • recognizes the human need to exploit the natural resources, anticipates potential consequences and proposes appropriate solutions • describes the main environmental problems • understands the causes and consequences of environmental problems • explains and describes examples of environmental problems in Slovenia and abroad

Prenesljive/ključne spretnosti in drugi atributi:	**Knowledge and understanding:**
Študent: • oceni globalen pomen pogostih okoljskih problemov • primerja okoljske probleme v različnih mednarodnih okoljih • pojasni vzroke in posledice okoljskih problemov ter oblikuje rešitve, tudi z vidika kulturnih in geografskih razlik • kritično ovrednoti rešitve okoljskega problema in napove potencialne strokovne ukrepe za izboljšanje okolja	Student: • assesses the significance of environmental problem globally • compares environmental problems in various international environments • explains the causes and consequences of environmental problems and formulates solution also from the aspects of intercultural and geographical differences • critically evaluates solutions to the environmental problems and suggests professional measures to improve the environment

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanje, seminarske vaje, terenske vaje, seminarska naloga.	Lectures, seminar work, fieldwork, seminar paper.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit. **Seminarska naloga.** Vprašanja pri pisnem izpitu se nanašajo na snov, podano na predavanjih. Ocenjevalna lestvica: ▪ zadostno 6: 60–67 % ▪ dobro 7: 68–75 % ▪ prav dobro 8: 76–83 % ▪ prav dobro 9: 84–90 % ▪ odlično 10: 91–100 %	**80** **20**	**Written examination.** **Seminar paper.** Questions for written examination are in relation to material delivered in lectures. Grading scale: ▪ Sufficient D (6): 60–67% ▪ Good C (7): 68–75% ▪ Very good B (8): 76–83% ▪ Very good B+ (9): 84–90% ▪ Excellent A (10): 91–100%

Materialni pogoji za izvedbo predmeta :	**Material conditions for subject realization:**
Predavalnica z multimedijsko opremo.	Classroom with the multimedia equipment.

Obveznosti študentov:	**Student's commitments:**

• obvezna udeležba na seminarskih in terenskih vajah • pozitivno ocenjena seminarska naloga	• Mandatory participation at seminar work and in the fieldwork • Positively rated seminar paper

Reference nosilca predmeta:	**Lecturer's references:**
Pred. dr. Anja Bubik: Pedagoško delo (VŠVO): sonosilka in soizvajalka predmeta Človek in okolje, asistentka pri predmetu Kemija in okolje, Ekotoksikologija Raziskovalno delo: preučevanje bioloških, biokemijskih in ekoloških učinkov cianobakterijskih metabolitov na humanih in bakterijskih celicah *in vitro*; pomen ozelenjevanja v urbanih središčih in njihov pomen pri blaženju podnebnih sprememb. **doc. dr. Samar Al Sayegh Petkovšek** Pedagoško delo: nosilka predmetov »*Projektno delo v biologiji in ekologiji*« ter »*Bioindikacija in biomonitoring*« magistrskega študija na Naravoslovno matematični fakulteti, Univerza v Mariboru in nosilka predmeta: »*Uvod v okoljske tehnologije*« na Visoki šoli za varstvo okolja v Velenju. Raziskovalno in strokovno delo: (i) okoljski monitoringi ob prometnicah, (ii) monitoringi učinkovitosti ukrepov za zmanjšanje povoza divjadi; (iii) ocene tveganja za okolje z uporabo receptorskih organizmov (npr. mali sesalci, ptice pevke), (iv) bioindikacija onesnaženosti vodnih ekosistemov z uporabo rib in bioindikacija kopenskih ekosistemov z uporabo deževnikov, malih sesalcev, iglic smreke in trosnjakov višjih gliv, (v) raziskave biotske pestrosti izbranih skupin (višje glive, žuželke), (vi) raziskave vplivov vojaške dejavnosti na okolje in (vii) raziskave vplive onesnaženega zraka (prašnih delcev) na zdravje ljudi.	**Pred. dr. Anja Bubik:** Pedagogic activities (EPC): lecturer of the subject Man and Environment, assistant of subjects Chemistry and Environment, Ecotoxicology Main research activities: studying the biological, biochemical and ecological effects of cyanobacterial metabolites on human and bacterial cells *in vitro*; greening in the urban environment and its role in mitigation of climate changes. **doc. dr. Samar Al Sayegh Petkovšek** Pedagogic activities: Holder of subjects: *Bioindication and biomonitoring* and *Project work in biology and ecology* at the University of Maribor and holder of the subject: *Introduction to the environmental technologies* at EPC. Main research and professional activities: (i) environmental monitoring along main roads and highways, (ii) monitoring of the effectiveness of mitigation measures for reducing traffic related mortality of wildlife; (iii) ecological risk assessment (with the use of small mammals and passerine birds); (iv) bioindication of terrestrial ecosystems and water ecosystems (with the use of earthworms, small mammals, Norway spruce needles, macrofungi, fish), (v) study of biodiversity of different taxa (macrofungi, insects) (vi) studies of impacts of military activities on the environment; (vii) assessment of health effects of polluted air (dust particles).

Izbrani znanstveni članki / Selected scientific papers:

- Sedmak, B., Carmeli, S., Pompe Novak, M., Tušek-Žnidarič, M., Grach-Pogrebinsky, O., Eleršek, T., Žužek, M. C., **Bubik, A.**, Frangež, R., 2009. Cyanobacterial cytoskeleton immunostaining: the detection of cyanobacterial cell lysis induced by planktopeptin BL1125. *Journal of plankton research*. 31 (11): 1321-1330.
- **Bubik, A.**, Sedmak, B., Novinec, M., Lenarčič, B., Lah Turnšek, T., 2008, Cytotoxic and peptidase inhibitory activities of selected non-hepatotoxic cyclic peptides from cyanobacteria. *Biological chemistry*. 10 (389): 1339-1346.
- **Bubik, A.**, Kolar, L., 2019, Raising awarness on environmental protection and improvement trough student project – a case study. *Journal of Engeneering Management and Competitiveness.* In press
- **Al Sayegh Petkovšek, S**., Kopušar, N., Pokorny, B., Tome, D., Kryštufek, B., 2017. Transfer of metals from soil to tissues of selected fee-living animals: a case study for Veliki Vrh. *Acta silvae et ligni*, 114: 1-20.
- **Al Sayegh Petkovšek S.**, Kopušar N., Kryštufek B., 2015. Small mammals as biomonitors of metal pollution: a case study in Slovenia. *Environmental monitoring and assessment*, 186:4261-4274.
- **Al Sayegh Petkovšek S.**, Kopušar N., Tome D., Kryštufek B., 2015. Risk assessment of metals and PAHs for receptor organisms in differently polluted areas in Slovenia. *Science of the total environment*, 532:404-414.
- **Al Sayegh Petkovšek, S**., Mazej Grudnik Z., Pandics T., Paldy, A., 2014. Assessment of health effects of ozone, PM2.5 and PM10 in the Šalek Valley (Slovenia) in comparison with selected Central European areas. *Central European Journal of Occupational and Environmental Medicine*, 20:103-118.
- **Al Sayegh Petkovšek S.**, 2013. Forest biomonitoring of the largest Slovene thermal power plant with respect to reduction of air pollution. *Environmental monitoring and assessment*, 185:1809-1823.
- **Al Sayegh Petkovšek S.**, Pokorny B., 2013. Lead and cadmium in mushrooms from the vicinity of two large emission sources in Slovenia. *Science of the total environment*, 443:944-954.
- **Al Sayegh Petkovšek S.**, Mazej Z., Pokorny B**.**, 2012. Heavy metals and arsenic concentrations in ten fish species from the Šalek lakes (Slovenia): assessment of potential human health risk due to fish consumption. *Environmental monitoring and assessment*, 184:2647-2662.
- **Al Sayegh Petkovšek S.**, Pokorny B., 2011. Cd, Hg, Pb, and As in European species of wild growing forest landscape fungi: a review. *Zbornik gozdarstva in lesarstva*, 94:3-20.

- Bole, M., **Al Sayegh Petkovšek, S.**, Druks Gajšek, P., Kogovšek, J., Petrič, M., Pokorny, B., 2011. Assessment of impact of the Poček military training area on karst waters. V: Knez M. (ur.), Petrič M. (ur.), Slabe T (ur.). Karstology and development challenges on karst. 1, Water, (Carsologica, ISSN 1854-2964, 13). Ljubljana: ZRC Publishing, str. 100-123.
- **Al Sayegh Petkovšek S.**, Poličnik H., Ramšak R., Mavec M., Pokorny B**.**, 2010. Ecological remediation of the Šoštanj thermal power plant with respect to sustainable development of the Šalek Valley, Slovenia. *Thermal science*, 14:773-782.
- Mazej Z., **Al Sayegh Petkovšek S.**, Pokorny B., 2010. Heavy metal concentrations in food chain of lake Velenjsko jezero, Slovenia: an artificial lake from mining. *Archives of environmental contamination and toxicology*, 58:998-1007.
- **Al Sayegh Petkovšek, S.**, Tome, D., Pokorny, B., 2010. Risk assessment of lead contamination for small mammal food chains (case study for shootinh ranges). *Zbornik gozdarstva in lesarstva*, let. 91, str. 13-30.