

Module: Antibiotics Resistance & Marine Conservation

Assigned module parts

Learning form	Course (compulsory)	Turnus	ECTS
Lecture & Seminar	Antibiotics Resistance & Marine Conservation	WiSe	3

Type of module	Elective module with compulsory courses
Participation requirements	None
Time in the course of studies	Semester 2
Duration	1 semester
Contents	The course "Antibiotic Resistance and Marine Conservation" consists of a blended learning system that includes synchronous and asynchronous units. The asynchronous content will be presented on the Moodle platform, where participants will explore the theoretical basis of the emergence of antibiotic-resistant bacteria and the pathways of spread between humans, animals, and the environment. They will also be introduced to recent scientific studies related to the One Health approach that show the link between marine life and antibiotic resistance, as well as will explore the impact of antibiotic resistance on marine life. Finally, interactive materials and sessions will allow participants to explore various research methods that can be used to investigate One Health issues. During synchronous sessions, participants will meet online via "Zoom" with our guest speakers and will be able to work in international and interdisciplinary teams on a study protocol focused on One Health topics.
Learning Outcomes	• Identify the definition, causes and routes of the spread of antibiotic resistance bacteria • Recognise antibiotic resistance as a One Health topic • Identify the various factors that impact marine life and their effect on human, animal and environmental health.

	• Explore the interconnection between marine life and antibiotics • Explore different research methods they can apply to study One Health topics
Form of the module examination	Poster presentation, Quiz, Written Assignment, Presentation
Type of assessment	The module is graded.
Prerequisite for the award of ECTS credits	The ECTS points are awarded upon passing the module examination assigned to the module (or the assigned compulsory and, if applicable, compulsory elective examination parts).
Person responsible for the module	Bernarda Espinoza Castro
Language(s) of instruction	English
Other information	None

Reading List

- **Fatimazahra, S.**, Latifa, M., Laila, S., & Monsif, K. (2023). Review of hospital effluents: Special emphasis on characterization, impact, and treatment of pollutants and antibiotic resistance. *Environmental Monitoring and Assessment*, 195(3), 393. [Springer].
- **Khan, N. A.**, et al. (2021). Emerging contaminants in wastewater: A critical review on occurrence, existing legislations, risk assessment, and sustainable treatment alternatives. *Environmental Science and Pollution Research*, 28(36), 49411–49443. [Springer]. (Note: Consolidated from multiple source drafts/files).
- **Krzeminski, P.**, et al. (2019). Performance of secondary wastewater treatment methods for the removal of contaminants of emerging concern implicated in crop uptake and antibiotic resistance spread: A review. *Science of the Total Environment*, 648, 1052–1081. [Elsevier].
- **Rodríguez-Molina, D.**, et al. (2021-2022). Additional publications and bibliographic details regarding the AWARE Study can be found on [Google Scholar](#).
- **Szekeres, E.**, et al. (2017). Abundance of antibiotics, antibiotic resistance genes and bacterial community composition in wastewater effluents from different Romanian hospitals. *Environmental Pollution*, 225, 304–315. [Elsevier].
- **Verlicchi, P.** (Ed.). (2015). *Hospital Wastewaters: Characteristics, Management, Treatment and Environmental Risks*. [Springer].
- **Wengenroth, L.**, et al. (2021). Antibiotic resistance in wastewater treatment plants and transmission risks for employees and residents: The concept of the AWARE study. *Antibiotics*, 10(5), 478. [MDPI].
- **Zhang, Y.**, Zhang, J., & Wang, J. (2020). Hospital wastewater as a reservoir for antibiotic resistance genes: A meta-analysis. *Frontiers in Public Health*, 8, 574968. [Frontiers Media].

Abbreviations and explanations

CP	Credit Points,
ECTS points	ECTS European Credit Transfer and Accumulation System
SoSe	Summer semester
WiSe	Winter semester