COURSE DATA

Data Subject	
Code	42612
Name	Criteria and tools for measuring water quality
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
2120 - M.D. in Water Resources Management	Faculty of Geography and History	1	First term

Subject-matter

Degree	Subject-matter	Character
2120 - M.D. in Water Resources Management	2 - Use of technology in the water cycle	Obligatory

Coordination

Name	Department
PICO GARCIA, YOLANDA	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.

SUMMARY

Basic training to design, apply and interpret instruments and methodologies of environmental monitoring. For this purpose, the whole analytical process will be studied from the sampling, method validation, different techniques of sample preparation and extraction, several methods to determine the analytes to the analytical applications: pesticides, perfluorinated compounds, heavy metals, etc.....

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

No specific knowledge is required previously.

OUTCOMES

2120 - M.D. in Water Resources Management

- Distinguir, evaluar e interpretar las distintas informaciones y sus contenidos, implementación, aplicación y grado de ejecución.

- Diagnosticar problemáticas generales en la gestión de los recursos hídricos y su repercusión en los planos social, económico y ambiental.

- Ser capaces de planificar una estrategia de control de calidad de aguas: diseño de la red de control, análisis de datos, propuesta de actuaciones para la minimización y prevención de la contaminación.
- Adquisición de conocimientos teórico-prácticos para evaluar la problemática que afecta a los ecosistemas acuáticos en lo que se refiere a contaminación del agua.
- Ser capaz de valorar la importancia de los elementos que componen las instalaciones relacionadas con el transporte y distribución en la gestión integral del agua.
- Conocer los principales procesos de depuración de aguas residuales y valorar las ventajas e inconvenientes de cada uno de ellos.

LEARNING OUTCOMES

1.-Basic training to design the analytical problem (after the real knowledge and planning of the environmental problem), at which the analytical process will be applied.

2.-To know the advantages and limitations of the chemical analysis in front to the use of biomarkers in the monitoring of environmental contamination.

3.-To know the particularities of each environmental compartment for the application of the analytical techniques more appropriate for the different contaminants.

4.-Understanding of the different steps of the analytical process as key element for submitting this information. This knowledge involves the techniques and methods applicable to the different groups of contaminants as well as a validation and calibration programme to guarantee the reliability of the results.

5.-Knowlegment of the best analytical technique for each type of sample and contaminant and the physico-chemical parameters to be taken into account related to both, sample and contaminant.

6. –To know the most important methods and strategies of environmental contaminant monitoring for its correct implementation in their future professional development.

7.-To know the possibilities and pitfalls of the results obtained when contaminants are analyzed and its application in the widest concept of environmental contamination and toxicology.

DESCRIPTION OF CONTENTS

1. Environmental Contamination

Environmetal contamination: priority contaminants in Europe, U.S.A EPA list. Legislation and state of the art. The role of chemical analysis in the monitoring of environmental contamination. Advantages and limitations.

2. Chemical Analysis

Sampling and sample preparation. Planning of a sampling operation. Preservation of sample integrity. Equipment and strategies for sampling in air, water, soil and sediments. Analysis of inorganic contaminants at trace and ultra-trace levels. Analysis of organic contaminants: off-line sample preparation techniques. Extraction/preconcentration from water samples. Gas preconcentration. Extraction of solid samples. Strategies to remove interferences. Analysis of organic contaminants: on-line sample preparation techniques. Extraction/preconcentration of water samples. Preconcentration of gases. Strategies to remove interferences. Instrumentation to determine organic and inorganic contaminants: LC-MS(MS), GC-MS(MS), AAS, ICP-MS, ICP-OES.

3. Validation and Applications

Validation of the analytical results and quantification in the instrumental analysis. Calibration. Limits of detection and quantification and limits of confidence. Sensitivity and selectivity. Analytical applications: pesticides, perfluorinated compounds, drugs of abuse, pharmaceuticals, polychlorinated biphenyls. Evaluation and interpretation of the data.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theoretical and practical classes	30,00	100
Development of group work	5,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	12,00	0
Preparation of practical classes and problem	5,00	0
Resolution of case studies	3,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

Theoretical lessons: 20 hours/course. The classes will be given with the aid of audiovisual technical material. The student will have available, in advance, this material in the virtual platform.

Practical cases: 10 hours/course. The students will apply the acquired knowledgement during the thoretical clases to solve practical cases about contamination problems.

EVALUATION

Written examination: The matter for exam include the lessons explained in the theoretical classes and the solve practical cases, with question of open and short answer or of alternative response (true-false) with argumentation and numerical resolution of practical cases. This exam represents the 75 % of the total punctuation. It is mandatory to obtain a minimum of 5 points over 10 to include this exam in the final results

Continuous evaluation: the attendance, progress of the student along the matter, actitude, interest and degree of participation in the matter is evaluated. This will represent a 25 % of the punctuation. It will be scored from 0 to 10. There is no minimum to take this score into account.

REFERENCES

Basic

- Achaval, A. Crecimiento demográfico y contaminación ambiental. Ed. Buenos Aires:Dunken 2006.
- Sabater, S. et al. (eds.), he Llobregat: The Story of a Polluted Mediterranean River, Hdb Env Chem, DOI 10.1007/698_2012_147, Springer-Verlag Berlin Heidelberg 2012.

- Barcelo, D. (ed) Aguas continentales. Gestión de recursos hídricos, tratamiento y calidad del agua, Cyan, Proyectos y Producciones Editoriales, 2008.

Additional

- Petrovic, M.; Barcelo, D., Analysis, fate and removal of pharmaceuticals in the water cycle, Comprehensive Analytical Chemistry, Wilson&Wilson, 2007.
- Pawliszyn, J. Sampling and simple preparation for field and laboratory, Comprehensive Analytical Chemistry, Wilson&Wilson, 2002.
- Barceló, D; Diedrich Hansen, P. Biosensors for Environmental Monitoring of Aquatic Systems, Springer Berlin Heidelberg, 2005.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available