



Asignatura: Chemical Monitoring
Código: 32765
Centro: Facultad de Ciencias
Titulación: Master of Inland Water Quality Assessment
Nivel: Master
Tipo: Obligatoria
Nº de créditos: 4

ASIGNATURA / **COURSE TITLE**

MONITORIZACIÓN QUÍMICA /**CHEMICAL MONITORING**

1.1. Código / **Course number**

32765

1.2. Materia / **Content area**

This course is mandatory and is not included in any higher rank area within the master

1.3. Tipo / **Course type**

Compulsory - Mandatory

1.4. Nivel / **Course level**

Master

1.5. Curso / **Year**

1st

1.6. Semestre / **Semester**

FIRST SEMESTER (Fall)

1.7. Número de créditos / **Credit allotment**

4 ECTS

1.8. Requisitos previos / **Prerequisites**

Graduate level knowledge of chemistry, geology and mathematics

1.9. Requisitos mínimos de asistencia a las sesiones presenciales / **Minimum attendance requirement**

Attendance to practical sessions is mandatory and at least 80 % of the theory classes.



Asignatura: Chemical Monitoring
Código: 32765
Centro: Facultad de Ciencias
Titulación: Master of Inland Water Quality Assessment
Nivel: Master
Tipo: Obligatoria
Nº de créditos: 4

1.10. Datos del profesor/ Faculty data

González Yélamos, Javier Departamento de Geología y Geoquímica
Facultad de Ciencias
Despacho: Modulo C-06, puerta 602
Dirección postal
Calle Francisco Tomás y Valiente, número 7
Localidad: Madrid
Código Postal: 28049
Teléfono: 914975036
Fax: 914974900
e-mail: javier.yelamos@uam.es
Skype: javier.gonzalez.yelamos

González Yélamos, Javier Geology and Geochemistry Department
Science Faculty
Office room: Module C-06, door 602
Postal address
7 Francisco Tomás y Valiente Street
City: Madrid
Postal Code: 28049
Telephone: +34914975036
Fax:+34914974900
e-mail: javier.yelamos@uam.es
Skype: javier.gonzalez.yelamos

1.11. Objetivos del curso / Course objectives

1.Content knowledge:

Natural chemistry of waters, with special attention to chemical monitoring.

The most common and most hazardous pollutants of inland waters and sources of their origin.

Water sampling and analysis techniques for pollutants and monitoring.

2. Skills and abilities:

To be able to test the validity of a chemical analysis.

To increase confidence in their ability to interpret the variation of data collected by a water quality station and to draw graphical representations of chemical data.



Asignatura: Chemical Monitoring
Código: 32765
Centro: Facultad de Ciencias
Titulación: Master of Inland Water Quality Assessment
Nivel: Master
Tipo: Obligatoria
Nº de créditos: 4

1.12. Contenidos del programa / Course contents

1. Basic aspects of water chemistry. Parameters and variables. Inorganic species and organic matter measurements
2. Natural chemical status of inland waters: rivers, lakes, groundwater. Acquisition of dissolved species in solution
3. Monitoring networks in the chemical quality of in Spain and European Directives: CEMAS, COCA, COAS, SAICA, fish life, OSPAR, exchange data UE, radiological, Eurowaternet, toxic and dangerous substances, nitrate network,
4. Water sampling, preservation and analysis procedures. Accuracy and precision in analysis
5. Non-point industrial pollution. Delimitation of contaminant plumes.
6. Diffuse or agricultural pollution. Nitrogen compounds and biocides.
7. Urban pollution. Sanitary landfill. Spills in urban sewage.
8. Complementary methods: tracers and isotope hydrochemistry.

1.13. Referencias de consulta / Course bibliography

- DOMENICO P. A. & SCHWARTZ, F. W. (1998). "Physical and Chemical Hydrogeology". 2nd edition. John Wiley and Sons, 506 pp.
- HEM, D. (1978). "Study and Interpretation of the Chemical Characteristics of Natural Waters". 2nd edition. U.S. Geological Survey Water Supply Paper, 1473, 363 p.
Available on line at <http://pubs.usgs.gov/wsp/wsp2254/pdf/wsp2254a.pdf>
- KEHEW, A. E. (2001). Applied Chemical Hydrogeology". Prentice Hall, 368 pp.
- RITTER, W. F. and SHIRMOHAMMADI, A., editors (2001). "Agricultural Nonpoint Source Pollution: Watershed Management and Hydrology". CRC, 352 pp.
- UNITED STATES GEOLOGICAL SURVEY, variously dated. National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A9.
Available on line at <http://pubs.water.usgs.gov/twri9A>.



Asignatura: Chemical Monitoring
Código: 32765
Centro: Facultad de Ciencias
Titulación: Master of Inland Water Quality Assessment
Nivel: Master
Tipo: Obligatoria
Nº de créditos: 4

WEINER, E. R. (2012). Applications of Environmental Aquatic Chemistry A Practical Guide. Third Edition. 618 pp.

WORLD HEALTH ORGANIZATION (2011). "Guidelines for Drinking-water Quality". 4th edition, 541 pp. Geneva.

Available on line at

http://www.who.int/water_sanitation_health/publications/2011/dwq_guidelines/en/

Main web-pages

UNITED STATES GEOLOGICAL SURVEY <http://www.usgs.org>

ENVIRONMENTAL PROTECTION AGENCY . Water topic
<http://www2.epa.gov/science-and-technology/water-science>

The Hazardous Waste Clean-up Information <http://www.clu-in.org/>

Water Information System for Europe <http://water.europa.eu/>

2. Métodos docentes / Teaching methodology

Lectures and practical desk exercises (both in class and as homework) are the main teaching methodology.

It is mandatory to write a report about one of the priority pollutants included in the legislation of the EU.

Tutorials could be by face to face, by e-mail or by using Skype software.

There is a field work (3 hours) in order to visit the mobile unit of the CIEMAT; it is one of the most sophisticated mobile laboratories all over the world. If it cannot visit, it will go to visit a river automatic monitoring station in the surroundings of the UAM or a laboratory.

The subject is complemented with other activities in the subject titled Integrated Monitoring, as sampling different bodies of water and chemical analysis of water samples in laboratory.



Asignatura: Chemical Monitoring
 Código: 32765
 Centro: Facultad de Ciencias
 Titulación: Master of Inland Water Quality Assessment
 Nivel: Master
 Tipo: Obligatoria
 N° de créditos: 4

3. Tiempo de trabajo del estudiante / **Student workload**

<i>Tasks</i>	hours
<i>lecture attendance: (face to face class)</i>	22
<i>Practical sessions (face to face class)</i>	10
<i>Homework exercises</i>	15
<i>Written report</i>	20
<i>Exam preparation:</i>	29
<i>Practical field trip</i>	3
<i>Examination:(face to face exam)</i>	4
<i>Total amount of work</i>	100

4. Métodos de evaluación y porcentaje en la calificación final / **Evaluation procedures and weight of components in the final grade**

- 1) Theory exam: test type multiple-choice items and short answers.
- 2) Practical final exam, which covers practical exercises done during the course.
- 3) Individually written report about the hydrological characteristics of a specific body of water.
- 4) Corrected at home work exercises.

Distribution of the final grade among the different activities and in relation to the amount of work the student has to do for the course, expressed in percentages



Asignatura: Chemical Monitoring
 Código: 32765
 Centro: Facultad de Ciencias
 Titulación: Master of Inland Water Quality Assessment
 Nivel: Master
 Tipo: Obligatoria
 N° de créditos: 4

Theory exam	35%
Practical test:	35%
Written report about one priority pollutant	20%
At home work exercises	10%

Maximum score, 10 points, expressed with one decimal.

Any student that participated less than 10% of evaluable activities will be qualified as “unevaluated”.

In the case that the student does not obtain the minimum requirements for passing the course (see evaluation section) will have another opportunity “convocatoria extraordinaria” at the end of the academic year.

5. Cronograma* / Course calendar at UAM

Month	Lectures	Practical session	Field trip	Final exam:
September	6 hours			
October	4 hours	4 hours		
November	6 hours	6 hours		
December	6 hours		3 hours	4 hours

*It is a tentative schedule course, for a more detail one, please checks the final calendar.