

Guía docente de la asignatura

Remote Imaging and SensingFecha última actualización: 30/06/2021
Fecha de aprobación por la Comisión Académica: 09/07/2021**Máster**

Máster Universitario Erasmus Mundus en Ciencia del Color, Imágenes y Visión Computacional

MÓDULO

Photonics, Image and Vision

RAMA

Ciencias

CENTRO RESPONSABLE DEL TÍTULO

Escuela Internacional de Posgrado

Semestre

Anual

Créditos

5

Tipo

Optativa

Tipo de enseñanza

Presencial

PRERREQUISITOS Y/O RECOMENDACIONES

None.

BREVE DESCRIPCIÓN DE CONTENIDOS (Según memoria de verificación del Máster)

This course develops the fundamentals of remote sensing techniques. The course covers the basic principles of remote sensing, a revision of the electromagnetic radiation and its interaction with matter, some basic ideas about the atmosphere both as a transfer medium and as an observational object, advanced topics in surface and atmosphere remote sensing. Different platforms and sensors used in remote sensing will be presented including imaging systems. Pre-processing aspects of remotely sensed data will be addressed paying special attention to atmospheric and radiometric corrections.

On completion of this course the students will be able to:

- Understand the bases of the remote sensing process.
- Approach to the remote sensing procedures applied to the surface and atmosphere.
- Distinguish the different kind of sensors and platforms used in remote sensing.
- Understand the need of atmospheric correction of surface remote sensing data.
- Apply atmospheric correction to real remote sensing data.
- Extract surface and atmospheric variables from remote sensing data.



COMPETENCIAS

COMPETENCIAS BÁSICAS

- CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.
- CB7 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
- CB8 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios.
- CB9 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.
- CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

RESULTADOS DE APRENDIZAJE (Objetivos)

- Knowledge and Comprehension of the fundamentals, principles, applications, limits, relationships, of all concepts and topics covered by this course;
- Application, Analysis, Synthesis and Evaluation skills of the main concepts and topics covered by this course;
- Ability to apply/implement concepts and principles introduced in the lectures on practical tasks and on industrial study cases;
- Ability to self-learn, to understand some problems and to suggest/find solutions to solve these problems.

PROGRAMA DE CONTENIDOS TEÓRICOS Y PRÁCTICOS

TEÓRICO

- (topic 1) Remote sensing: basic principles
- (topic 2) Electromagnetic radiation and its interaction with matter.
- (topic 3) Basics principles of atmospheric remote sensing and radiative transfer.
- (topic 4) Remote sensing sensors: airborne and surface systems, optical, UV-VIS-IR and microwave sensors, imaging and non-imaging systems.
- (topic 5) Pre-processing of remotely sensed-data: atmospheric correction, calibration.
- (topic 6) Extraction of surface and atmospheric variables from remote sensing data.
- (topic 8) Future applications.

PRÁCTICO



- Design of look up tables for atmospheric correction.
- Atmospheric correction of remote sensing images.
- Extraction of geophysical surface and atmospheric variables from remote sensing data.

BIBLIOGRAFÍA

BIBLIOGRAFÍA FUNDAMENTAL

- CAMPBELL, J.B., Introduction to remote sensing, The Guildford Press, New York, 1987.
- CURRAN, P., Principles of remote sensing. Longman Scientific & Technical, New York, 1985.
- ELACHI, C., Introduction to the physics and techniques of remote sensing. John Willey & Sons, New York, 1987.

BIBLIOGRAFÍA COMPLEMENTARIA

- LENOBLE, J., Atmospheric radiative transfer. A. Deepak Publishing, Virginia, 1993.
- LIOU, K.N., An introduction to atmospheric radiation. Academic Press, New York, 2002.
- MATHER, P.M., Computer processing of remotely-sensed images. An introduction. John Willey & Sons, Chichester, England, 1999.
- SLATER, P.N., Remote sensing. Optics and optical systems. Addison-Wesley Publishing Company, Reading, Massachusetts, 1980.

ENLACES RECOMENDADOS

Library of the University of Granada: <http://biblioteca.ugr.es/>

NASA: <http://www.nasa.gov/>

NOAA: <http://www.noaa.gov/satellites.html>

AERONET: <http://aeronet.gsfc.nasa.gov/>

ACTRIS: <http://www.actris.net/>

GALION: <http://alg.umbc.edu/galion/>

EUSAAR: <http://www.eusaar.net/>

NOAA-Global Monitoring Division: <http://www.esrl.noaa.gov/gmd/aero/>

BSC-DREAM:
<http://www.bsc.es/earth-sciences/mineral-dust-forecast-system/bsc-dream8b-forecast>

EOSDIS: <https://earthdata.nasa.gov/>



EOS: <http://eosps0.gsfc.nasa.gov/>

MODIS: <http://modis.gsfc.nasa.gov/>

ESA: http://www.esa.int/esl/ESA_in_your_country/Spain

GIOVANNI: <http://disc.sci.gsfc.nasa.gov/giovanni>

HYSPLIT: <http://ready.arl.noaa.gov/>

NASA-Ozone & Air Quality: <http://ozoneaq.gsfc.nasa.gov/>

WMO: <https://www.wmo.int>

REDIAM: <http://www.juntadeandalucia.es/medioambiente/site/rediam/>

EVALUACIÓN (instrumentos de evaluación, criterios de evaluación y porcentaje sobre la calificación final)

EVALUACIÓN ORDINARIA

FORM/S OF ASSESSMENT: Written exam (50%), Practical works (50%)

ASSESSMENT CRITERION

Written exam and Practical works

Excellent - outstanding performance (A)

Very Good - above the average standard but with some errors (B)

Good - generally sound work with a number of notable errors (C)

Satisfactory - fair but with significant shortcomings (D)

Sufficient - performance meets the minimum criteria (E)

Fail - some more work required before the credit can be awarded (FX)

Fail - considerable further work is required (F)

Detail of criteria used to assess acquired skills :

- Activities and questionnaires giving evidence of knowing (20%)
- Activities and questionnaires giving evidence of comprehension/understanding (20%)
- Activities and questionnaires giving evidence of analysis (20%)
- Activities and questionnaires giving evidence of synthesis (20%)
- Activities and questionnaires giving evidence of evaluation (20%)

Excellent (A)

Very Good - above the average standard (B)

Good - generally sound well (C)

Satisfactory - but with significant shortcomings (D)

Sufficient - performance meets the minimum criteria (E)

Fail - some more work required (FX)

Fail - considerable further work is required (F)

The evaluation of informal learning outcomes will be based on questionnaires and laboratory notebook (self-evaluation, learning diary).

Attendance at the theoretical and practical sessions is required.



EVALUACIÓN EXTRAORDINARIA

FORM/S OF ASSESSMENT: Written exam (50%), Practical exam (50%)

ASSESSMENT CRITERION

Written exam and Practical exam

Excellent - outstanding performance (A)

Very Good - above the average standard but with some errors (B)

Good - generally sound work with a number of notable errors (C)

Satisfactory - fair but with significant shortcomings (D)

Sufficient - performance meets the minimum criteria (E)

Fail - some more work required before the credit can be awarded (FX)

Fail - considerable further work is required (F)

Detail of criteria used to assess acquired skills :

- Questionnaires giving evidence of knowing (20%)
- Questionnaires giving evidence of comprehension/understanding (20%)
- Questionnaires giving evidence of analysis (20%)
- Questionnaires giving evidence of synthesis (20%)
- Questionnaires giving evidence of evaluation (20%)

Excellent (A)

Very Good - above the average standard (B)

Good - generally sound well (C)

Satisfactory - but with significant shortcomings (D)

Sufficient - performance meets the minimum criteria (E)

Fail - some more work required (FX)

Fail - considerable further work is required (F)

EVALUACIÓN ÚNICA FINAL

To qualify for the only final evaluation, the student, in the first two weeks of teaching, or in the two weeks following if it has occurred after the start of the teaching, will request it, through the electronic procedure, to the COSI Coordinator, alleging and proving the reasons that assist him for not being able to follow the continuous evaluation system.

The final exam (single act) will consist of questions related to the program of the theory and practical subject, and that it is necessary to pass each of the tests (Sufficient, E) to apply the percentages.

Written exam (50%)

Practical exam (50%)

ASSESSMENT CRITERION

Written exam and Practical exam

Excellent - outstanding performance (A)

Very Good - above the average standard but with some errors (B)

Good - generally sound work with a number of notable errors (C)

Satisfactory - fair but with significant shortcomings (D)

Sufficient - performance meets the minimum criteria (E)



Fail - some more work required before the credit can be awarded (FX)

Fail - considerable further work is required (F)

Detail of criteria used to assess acquired skills :

- Questionnaires giving evidence of knowing (20%)
- Questionnaires giving evidence of comprehension/understanding (20%)
- Questionnaires giving evidence of analysis (20%)
- Questionnaires giving evidence of synthesis (20%)
- Questionnaires giving evidence of evaluation (20%)

Excellent (A)

Very Good - above the average standard (B)

Good - generally sound well (C)

Satisfactory - but with significant shortcomings (D)

Sufficient - performance meets the minimum criteria (E)

Fail - some more work required (FX)

Fail - considerable further work is required (F)

INFORMACIÓN ADICIONAL

Assessment and qualification regulations at the University of Granada:

[http://secretariageneral.ugr.es/pages/normativa/fichasugr/ncg7121/!](http://secretariageneral.ugr.es/pages/normativa/fichasugr/ncg7121/)

