



Universidad de Jaén

School of Engineering of Jaén

Non-Cartographic methods and applications

2024-2025

Grado en Ingeniería Geomática y Topográfica (E.P.S. Jaén)



CREA



Acceso Mayores 40

Guías docentes UJA

Horarios de tutorías

Llamamientos PAU

Movilidad (Coordinador)

P.O.D.

Solicitud bilingüismo

Syllabus 2024-25 - 13212016 - Non-Cartographic Methods and Applications (Métodos y aplicaciones no cartográficas)

Caption

- Level 1: Tutorial support sessions, materials and exams in this language
- Level 2: Tutorial support sessions, materials, exams and seminars in this language
- Level 3: Tutorial support sessions, materials, exams, seminars and regular lectures in this language

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DEGREE:

Grado en Ingeniería geomática y topográfica

FACULTY:

SCHOOL OF ENGINEERING OF JAÉN

ACADEMIC YEAR:

2024-25

COURSE:

Non-Cartographic Methods and Applications

SYLLABUS

1. COURSE BASIC INFORMATION

NAME: Non-Cartographic Methods and Applications

CODE: 13212016

ACADEMIC YEAR: 2024-25

LANGUAGE: English

LEVEL: 2

ECTS CREDITS: 6.0

YEAR: 4

SEMESTER: PC

2. LECTURER BASIC INFORMATION

NAME: CARDENAL ESCARCENA, FRANCISCO JAVIER

DEPARTMENT: U119 - INGENIERÍA CARTOGR. GEODESICA Y FOTOGRAM

FIELD OF STUDY: 505 - INGENIERÍA CARTOGRÁFICA, GEODÉSICA Y FOTOGRAMETRÍA

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LANGUAGE: English

LEVEL: 2

3. CONTENT DESCRIPTION

THEORY

1. INTRODUCTION

1.1. Introduction.

1.2. Historical development.

2. INSTRUMENTATION Y METHODS IN CLOSE RANGE PHOTOGRAMMETRY.

2.1. Instrumentation in close range photogrammetry. Data acquisition systems: cameras (metric and non metric).

2.2. Data reduction systems. Low cost Systems. Industrial systems (*Turn key systems*).

2.3. Light aerial platforms (unmanned aerial systems, UAS). Regulations. Workflow with UAS.

2.4. Methods in close range photogrammetry.

2.4.1 Stereo-photogrammetry and monoscopic convergent photogrammetry. Targets.

2.4.2 Non metric cameras calibration methods.

2.4.3 Direct linear transformation (DLT). Structure from motion (SfM) and Multi-View Stereo (MVS).

2.4.4 Network design in close range photogrammetry. Development of an algorithm for network simulation.

2.4.5 Design, observation and calculation of ancillaries control networks.

3. CONVENTIONAL APPLICATIONS OF CLOSE RANGE PHOTOGRAMMETRY.

3.1. Industrial photogrammetry.

3.2. Photogrammetry applied to civil engineering, geotechnics, agriculture, environmental and Earth sciences.

3.3. Photogrammetry applied to architecture, archaeology and restoration.

3.4. Forensic photogrammetry.

4. NEW TRENDS AND NON CONVENTIONAL APPLICATIONS.

4.1. Terrestrial laser scanners (TLS).

4.1.1. Fundamentals and types of systems.

4.1.2. Data capture methods. Point clouds.

4.1.3. Data processing, merging and registering.

4.1.4. Non cartographic applications.

4.2. Real time surveys (mobile mapping).

4.2.1 Fundamentals.

4.2.2 Direct orientation and data processing.

4.2.3 Applications.

4.3. Others: underwater photogrammetry, biomedical applications, others.

PRACTICE

1. Camera calibration: plumb line method and selfcalibration.

2. Targets and digital automatic measurements.

3. Monoscopic convergent photogrammetry: DLT.

4. Network simulation.

5. Use of low cost photogrammetric Workstation.

6. Terrestrial laser scanner.

7. UAS mission planning.

8. Actual work project (design, execution, final products).

4. COURSE DESCRIPTION AND TEACHING METHODOLOGY

Lectures will involve:

- Theoretical lessons by means of master classes with student participation.
- Practice lessons based on the use of photogrammetric workstations, project based learning example, seminars, use of specific software (both photogrammetric and laser scanning) and practice exercises.

Students with special educational needs should contact the Student Attention Service (Servicio de Atención y Ayudas al Estudiante) in order to receive the appropriate academic support

5. ASSESSMENT METHODOLOGY

The assessment has three parts: attendance, theory+exercises and practice.

Attendance: attendance will be controlled both at theory and practice lessons. It is required at least a minimum of 75% attendance to the practical lessons and active participation on the Web-Learning System (ILIAS).

Theory+exercises: written exam which includes the theoretical and practice contents of the subject and some exercises or problems.

Practice: the assessment is based on the submission of the projects and exercises made during the practice lessons and the actual own-developed project. All exercises marked as compulsory must be delivered in order to pass the practice lessons.

The final mark will be the weighted average of the three parts (attendance, exam and practice), being the weights 0.1, 0.6 and 0.3, respectively. In order to pass the subject, it is necessary to get at least a mark of 5.0 but in order to compute the mark is mandatory to get at least 4.0 (4.0 out of 10) in all three parts.

6. BOOKLIST ([Access the bibliography in the Library catalog](#))

MAIN BOOKLIST:

- Close range photogrammetry and machine vision. Edition: -. Author: Atkinson, K.B. (ed.). Publisher: Scotland: Whittles, 2011 ([Library](#))
- Applications of 3D measurement from images. Edition: -. Author: Fryer, J., Mitchel, H. y Chandler, J. . Publisher: Scotland: Whittles Publishing, 2007 ([Library](#))
- Close range photogrammetry: principles, techniques and applications. Edition: -. Author: Luhman, T., Robson, S., Kyle, S. and Harley, I. . Publisher: Scotland: Whittles, 2006 ([Library](#))
- Advances in photogrammetry, remote sensing, and spatial information sciences: 2008 ISPRS congress bo. Edition: -. Author: Zhilin, Chen y Baltsavias. Publisher: Boca Raton : Taylor & Francis, 2008 ([Library](#))
- Photogrammetry: geometry from images and laser scans. Edition: 2nd ed.. Author: Kraus, Karl. Publisher: Berlin ; New York : Walter De Gruyter, 2007 ([Library](#))
- Advances in mobile mapping technology. Edition: -. Author: Tao & Li (ed.). Publisher: London : Taylor & Francis, 2007 ([Library](#))
- Airborne and terrestrial laser scanning. Edition: -. Author: - Vosselman, G. y Maas, H.G. (eds.). Publisher: Scotland : Whittles Publishing Services ; Boca Raton : CRC Press, 2010 ([Library](#))
- Topographic laser ranging and scanning: principles and processing. Edition: -. Author: Shan, J. and Toth, C.K. . Publisher: Boca Raton : CRC Press Taylor & Francis Group, c2009 ([Library](#))
- Small-format aerial photography : principles, techniques and geoscience applications. Edition: 1st ed.. Author: Aber, James S.. Publisher: Amsterdam [etc.] : Elsevier, 2010 ([Library](#))
- Close-Range Photogrammetry and 3D Imaging. Edition: 2. Author: Luhmann, Thomas; Robson, Stuart; Kyle, Stephen; Boehm, Jan. Publisher: De Gruyter ([Library](#))
- Manual of photogrammetry. Edition: 6th ed. Author: McGlone, J.C. (ed.). Publisher: Bethesda (Md.): American Society for Photogrammetry and Remote Sensing, cop. 2013.
 - **Notes:** Revised 6th edition ([Library](#))
- Multiple view geometry in computer vision. Edition: 2nd. ed., reprinted. Author: Hartley, Richard. Publisher: Cambridge : Cambridge University Press, 2004 ([Library](#))
- Photogrammetric computer vision : statistics, geometry, orientation and reconstruction. Edition: -. Author: Förstner, Wolfgang. Publisher: Cham: Springer, 2016 ([Library](#))
- Small-format aerial photography and UAS imagery : principles, techniques, and geoscience applications Susan Elizabeth Ward Aber, James S. Aber, Irene Marzloff, Johannes Ries. Edition: Second edition. Author: Aber, James S., author.. Publisher: Elsevier ([Library](#))

ADDITIONAL BOOKLIST:

- Introduction to modern photogrammetry . Edition: -. Author: Mikhail, Edward M.. Publisher: New York: John Wiley, cop. 2001 ([Library](#))
- Non-topographic photogrammetry. Edition: 2nd ed. Author: Karara (ed.). Publisher: Virginia: American Society for Photogrammetry and Remote Sensing, 1989
- Adjustment Computations: spatial data analysis Charles D. Ghilani, Paul R. Wolf. Edition: 4th ed. Author: Ghilani, Charles D.. Publisher: New Jersey: John Wiley & Sons, cop. 2006 ([Library](#))

7. SUSTAINABLE DEVELOPMENT GOALS

Educación de calidad

DETAILED INFORMATION

Goal 4. Quality Education:

Target 4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

8. VIRTUAL / CLASSROOM TEACHING SCENARIO

Given the number of students and the classroom capacities, lessons and examination will be given at the classrooms/laboratories.

LECTURES

The assessment has three parts: attendance, theory+exercises and practice.

Attendance: attendance will be controlled both at theory and practice lessons. It is required at least a minimum of 75% attendance to the practical lessons and active participation on the Web-Learning System.

Theory+exercises: written exam which includes the theoretical and practice contents of the subject and some exercises or problems.

Practice: the assessment is based on the submission of the projects and exercises made during the practice lessons and the actual own-developed project.

The final mark will be the weighted average of the three parts (attendance, exam and practice), being the weights 0.1, 0.6 and 0.3, respectively. In order to pass the subject, it is necessary to get at least a mark of 5.0 but in order to compute the mark is mandatory to get at least 4.0 (4.0 out of 10) in all three parts.

9. VIRTUAL TEACHING SCENARIO

LECTURES

Lectures will involve:

- Theoretical lessons by means of master classes with student participation. Lessons will be given on line (for example using Google Meet or PLATEA system).
- Practice lessons based on the use of project based learning examples, seminars, use of specific software (both photogrammetric and laser scanning) and practice exercises. Material (data, tutorials, documentation, etc.) for the practical exercises will be provided by the lecturers. Practical lessons will be supported on line by the UJA's Learning Management System and Google Meet.

ASSESSMENT

The assessment has three parts: attendance, theory+exercises and practice.

Attendance (10%): attendance will be controlled both at theory and practice lessons. It is required at least a minimum of 75% attendance to the practical lessons and active participation on the UJA's Web-Learning System.

Theory+exercises (50%): on-line exam which includes the theoretical and practice contents of the subject and some exercises or problems. UJA's Web-Learning System and Google Meet will be used.

Practice (40%): the assessment is based on the submission of the projects and exercises made during the practice lessons and the actual own-developed project. If required, student can be requested to clarify how they did the exercises by means of on-line platforms (UJA's Web-Learning System, Google Meet, email, etc.).

The final mark will be the weighted average of the three parts (attendance, exam and practice), being the weights 0.1, 0.5 and 0.4, respectively. In order to pass the subject, it is necessary to get at least a mark of 5.0 but in order to compute the mark is mandatory to get at least 4.0 (4.0 out of 10) in all three parts.

DATA PROTECTION CLAUSE (on line exams)

Institution in charge of data processing: Universidad de Jaén, Campus Las Lagunillas, s/n, 23071 Jaén

Data Protection Delegate: dpo@ujaen.es

Purpose: In accordance with the Universities Law and other national and regional regulations in force, carrying out exams and assessment tests corresponding to the courses students are registered in. In order to avoid frauds while sitting the exam, the exam will be answered using a videoconference system, being able the academic staff of the University of Jaén to compare and contrast the image of the person who is answering the exam with the student's photographic files. Likewise, in order to provide the exam with evidential content for revisions or claims, in accordance with current regulation frameworks, the exam will be recorded and stored.

Legitimacy: compliance with legal obligations (Universities Law) and other national and regional regulations currently in force.

Addressees: service providers who are the owners of the platforms where the exams are carried out and with whom the University of Jaén has signed the corresponding data access contracts.

Storage periods: those established in current in force regulations. In the specific case of exam videoconference recordings, not before the examination records and transcripts are closed or the exam can still be reviewed or challenged.

Rights: you can exercise your right of access, amendment, cancellation, opposition, suppression, limitation and portability by sending a letter to the postal or electronic address indicated above. In the event that you consider that your rights have been violated, you may submit a complaint to the Andalusian Council for Transparency and Data Protection www.ctpdandalucia.es

CLASS RECORDING CLAUSE PERSONAL DATA PROTECTION

Person in charge: Universidad de Jaén, Paraje Las Lagunillas, s/n; Tel.953 212121; www.ujaen.es

Data protection delegate (DPO): TELEFÓNICA, S.A.U. ; Email: dpo@ujaen.es

Procedure aim: To manage proper recordings of teaching sessions with the aim of facilitating learning process under a multimodal and/or online teaching

Period for record storage: Images will be kept during legal term according to regulations in force

Legitimacy: Data will be managed according to legal regulations (Organic Law 6/2001, December 21, on Universities) and given consent provided by selecting corresponding box in legal admission documents

Data recipients (transfers or assignments): Any person allowed to get access to every teaching modality

Rights: You may exercise your rights of access, rectification, cancellation, portability, limitation of processing, deletion or, where appropriate, opposition. To exercise these rights, you must submit a written request to the Information, Registration and Electronic Administration Service of the University of Jaen at the address above, or by e-mail to the address above. You must specify which of these rights you are requesting to be satisfied and, at the same time, you must attach a photocopy of your ID card or equivalent identification document. In case you act through a representative, legal or voluntary, you must also provide a document that proves this representation and identification. Likewise, if you consider that your right to personal data protection has been violated, you may file a complaint with the Andalusian Data Protection and Transparency Council www.ctpdandalucia.es

Campus Las Lagunillas s/n | 23071 - Jaén

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