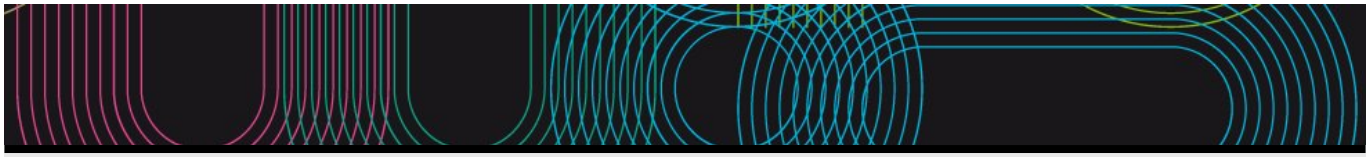

| IDENTIFYING DATA | | | | |
|---|---|---|---|---|
| **Fundamentals of Image Processing** | | | | |
| Subject | Fundamentals of Image Processing | | | |
| Code | V05G301V01333 | | | |
| Study programme | Grado en Ingeniería de Tecnologías de Telecomunicación | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 3rd | 2nd |
| Teaching language | #EnglishFriendly<br>Spanish | | | |
| Department | | | | |
| Coordinator | Martín Herrero, Julio | | | |
| Lecturers | Martín Herrero, Julio | | | |
| E-mail | julio@uvigo.es | | | |
| Web | http://moovi.uvigo.es | | | |
| General description | Introduces to the student the basics of digital image processing.<br>English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English. | | | |

| Training and Learning Results | |
|---|---|
| Code | |
| B3 | CG3: The knowledge of basic subjects and technologies that enables the student to learn new methods and technologies, as well as to give him great versatility to confront and adapt to new situations |
| B4 | CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity. |
| B10 | CG10 The ability for critical reading of scientific papers and docs. |
| C34 | CE34/SI1The ability to construct, exploit and manage telecommunication services and applications, such as receiving, digital and analogical treatment, codification, transporting and representation, processing, storage, reproduction, management and presentation of audiovisual and multimedia information services. |
| C38 | CE38/SI5 The ability to create, modify, manage, broadcast and distribute multimedia contents taking into account the use and accessibility criteria to audiovisual, broadcasting and interactive services. |
| D2 | CT2 Understanding Engineering within a framework of sustainable development. |

| Expected results from this subject | Training and Learning Results | | |
|---|---|---|---|
| Understand the nature and organisation of digital images | B3<br>B10 | C34<br>C38 | |
| Learn to process digital images | B3<br>B4<br>B10 | C34<br>C38 | D2 |
| Learn how to program a computer to process a digital image | B3<br>B4<br>B10 | C34<br>C38 | D2 |
| Understand how the fundamental technics of image processing work | B3<br>B10 | C34<br>C38 | |
| Apply fundamental processing technics to solve specific problems with images or groups of images | B3<br>B4 | C34<br>C38 | |

| Contents | |
|---|---|
| Topic | |
| GUI programming | . |

| | |
|---|---|
| Basic preprocessing. | . |
| Image restoration. | . |
| Global and local operators. | . |
| Linear and nonlinear filters. | . |
| Segmentation | . |
| Mathematical morphology. | . |

## Planning

| | Class hours | Hours outside the classroom | Total hours |
|---|---|---|---|
| Practices through ICT | 19.6 | 78.4 | 98 |
| Lecturing | 21 | 21 | 42 |
| Systematic observation | 0.01 | 0 | 0.01 |
| Laboratory practice | 2 | 8 | 10 |

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

## Methodologies

| | Description |
|---|---|
| Practices through ICT | Handling and tuning analytic tools and algorithms, identifying which ones to use in different scenarios. All learning aims are addressed. |
| Lecturing | Master talks by the teacher on central topics, promoting critical discussion of concepts. All learning aims are addressed. |

## Personalized assistance

| Methodologies | Description |
|---|---|
| Practices through ICT | Implementation of image processing methods within an image processing and visualization framework with graphic user interface, programming in C and C++. Doubts are solved in the classroom and in private sessions. |

## Assessment

| | Description | Qualification | Training and Learning Results | | |
|---|---|---|---|---|---|
| Practices through ICT | Personalised monitoring of the student's work, with feedback. All teaching aims specified in the corresponding section of this guide are evaluated. | 100 | B3<br>B4<br>B10 | C34<br>C38 | D2 |
| Systematic observation | Personalised monitoring of the student's work, with feedback. All teaching aims specified in the corresponding section of this guide are evaluated. | 100 | B3<br>B4<br>B10 | C34<br>C38 | D2 |
| Laboratory practice | Final exam. | 100 | B3<br>B4<br>B10 | C34<br>C38 | D2 |

## Other comments on the Evaluation

The assistance to class under continuous evaluation is compulsory, unless exceptional circumstances concur. Continuous evaluation is used for assessment, based on the work of the student. There is a final exam in the official date marked by the Board of School in May, for those students that have not passed the continuous evaluation. This final exam will be marked between 0 and 10 points. It covers all the subjects seen during the semester. To approve, the student has to obtain, at least, five points. Students wishing to improve their continuous evaluation marks can also attend the final exam: in this case the mark of this exam will be the final mark. The students that have passed the continuous evaluation and are satisfied with their mark do not need to attend the final exam. Along the semester the students will receive feedback on their progress, and the final mark of continuous evaluation will be communicated to the students well before the final exam. The delivery of the personal work the last week of class will imply the official participation in continuous evaluation.

The extraordinary evaluation of July will be an extraordinary final exam, for those students that have not passed neither the continuous evaluation neither the final exam in May. The final mark will be the mark of the extraordinary final exam in both cases. This extraordinary final exam will be marked between 0 and 10 points, and covers all the subjects. To approve, the student has to obtain, at least, five points.

Note that there are two final exams, but both correspond to a single and the same call ("convocatoria").

## Sources of information

**Basic Bibliography**

Rafael C. Gonzalez, Richard E. Woods, **Digital Image Processing**, 3ª, Prentice Hall,

**Complementary Bibliography**

Robert Laganière, **OpenCV Computer Vision Application Programming Cookbook**, Packt Publishing, 2014

Jasmin Blanchette, Mark Summerfield, **C++ GUI Programming with Qt 4**, Prentice Hall, 2008

## Recommendations

**Subjects that are recommended to be taken simultaneously**

Imaging Systems/V05G301V01332

**Subjects that it is recommended to have taken before**

Programming I/V05G301V01105
Programming II/V05G301V01110

**Other comments**

Simultaneously taking the subject Imaging Systems is emphatically recommended. You also should have passed the subject Programming, or have some notions of, at least, C programming.