UNIVERSIDADE DA CORUÑA

| Teaching Guide | | | | |
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| Identifying Data | | | | 2014/15 |
| Subject (*) | Laboautomatización | | Code | 610G01038 |
| Study programme | Grao en Química | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Graduate | 2nd four-month period | Fourth | Optativa | 4.5 |
| Language | SpanishGalician | | | |
| Prerequisites | | | | |
| Department | Química Física e Enxeñaría Química 1 | | | |
| Coordinador | Barriada Pereira, José Luis | E-mail | jose.barriada@udc.es | |
| Lecturers | Barriada Pereira, José Luis<br>Penedo Blanco, Francisco Jose | E-mail | jose.barriada@udc.es<br>francisco.penedo.blanco@udc.es | |
| Web | campusvirtual.udc.es/moodle | | | |
| General description | Unha parte moi importante do traballo que se fai nun laboratorio consite na realización de medidas, análise dos resultados obtidos e utilización de novas condicións experimentais en función dos mesmos. En moitas ocasións estas operacións pódense realizar de forma automática mediante un PC sen a necesidade de estar presente durante o proceso, utilizando os equipos dispoñibles no laboratorio. Nesta asignatura ensinaranse distintas estratexias para poder realizar este tipo de decisións automáticas que facilitan o traballo diario dun laboratorio. | | | |

| Study programme competences | |
|---|---|
| Code | Study programme competences |
| A19 | Ability to follow standard procedures and handle scientific equipment |
| A20 | Ability to interpret data resulting from laboratory observation and measurement |
| A22 | Ability to plan, design and develop projects and experiments |
| A23 | Critical standards of excellence in experimental technique and analysis |
| A25 | Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life |
| B2 | Effective problem solving |
| B3 | Application of logical, critical, creative thinking |
| C3 | Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life |
| C6 | Ability to assess critically the knowledge, technology and information available for problem solving |

| Learning outcomes | | | |
|---|---|---|---|
| Subject competencies (Learning outcomes) | Study programme competences | | |
| To know the basic concepts about equipment control and communication between equipment and PC | A19 | | C3 |
| To know the basic programming elements within the LabVIEW program environment. | A20<br>A22<br>A23<br>A25 | B3 | C3<br>C6 |
| To develop procedures for data acquisition and analysis form the instrumentation available in the laboratory. | A19<br>A20<br>A22<br>A23<br>A25 | B2<br>B3 | C3<br>C6 |
| To process the numerical data obtained from the acquisition, to create final reports of results with the appropriate format considering the experiment and control process. | A20<br>A22 | B3 | C3<br>C6 |

| Contents | |
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| Topic | Sub-topic |

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| -General concepts in system control. | -Basic principles. Types of control. Discrete sytems. Control diagrams. General targets and evaluation criteria. Digital and analog data. Programmable logic controller. |
| -Introduction to graphical programming using LabVIEW | -Front panel, block diagram, tool bars and pop-up menus. Virtual instruments |
| -Components of a virtual instrument. | -Controls, indicators and constants. Data-flow execution structures. Data categories in LabVIEW. |
| -Basic operations with data. | -Logic operators. Mathematical operators. Array an clusters build-up. |
| -The use of structures. | -For and While loops. Making decisions with Case structure. Sequences. Formulas. Advanced structures. |
| -Data representation and storage. | -Graphic representations. Input and output files. |
| -Advance tasks. | -Creation of subVI's. Local variables and "shift registers". Property node. Icon edition and terminal connection. |
| -Instrument control. | -Types of connections. Instrument control through RS232 connection. |

| Planning | | | |
|---|---|---|---|
| Methodologies / tests | Ordinary class hours | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | 8 | 16 | 24 |
| ICT practicals | 3 | 10.5 | 13.5 |
| Laboratory practice | 30 | 42 | 72 |
| Mixed objective/subjective test | 2 | 0 | 2 |
| Personalized attention | 1 | 0 | 1 |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. | | | |

| Methodologies | |
|---|---|
| Methodologies | Description |
| Guest lecture / keynote speech | Lectures where the theoretical concepts are introduced, and basic introduction to the use of LabVIEW program is given. |
| ICT practicals | Practical sessions where simple exercises are solved in order to get familiar with the use of the program as well as the application of logic process in programming, |
| Laboratory practice | Laboratory demonstrations where the knowledge acquired is applied to common situations during the use of laboratory equipments. |
| Mixed objective/subjective test | Final test where the subject knowledge, both theoretical and practical, is evaluated. |

| Personalized attention | |
|---|---|
| Methodologies | Description |
| Laboratory practice ICT practicals | Students should present suggested exercises where the knwoledge acquisition will be checked. Doubts and problems will be also clarified. |

| Assessment | | |
|---|---|---|
| Methodologies | Description | Qualification |
| Laboratory practice | Common situations such as equipment communication and operation will be analysed and solved. Competencies assessed: A19, A20, A22, A23, B2, B3, C3 | 50 |
| Mixed objective/subjective test | Basic theoretical concepts and instrument control and data manipulation skills will be assessed. Competencies assessed: A20, A22, A25, B3, C6 | 50 |

| Assessment comments |
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| -Positive final assessment could not be achieved if a mark lower than 3 out of 10 is attained in any of the two methodologies to be evaluated (i.e. Laboratory practice and Mixed objective/subjective test).<br>-Minimum mark to successfully pass the subject is 5 out of 10 obtained as an average of the two qualifications achieved.<br>-Considering the previous two items, in the case of an average mark equal or greater that 5 out of 10, but without achieving the minimum mark required in any of the two assessed methodologies, the final mark will appear as FAIL (4.5).<br>-For the second opportunity (retake), any of the two previous marks with a minimum of 5 out of 10 can be maintained. But none of them will be maintained if the student has to repeat the subject the following year.<br>-"Not attended" assessment mark will be allocated to those students not starting the laboratory practice.<br>-To successfully pass the subject it is compulsory for the students to participate both in the laboratory practices and the final test.<br>-Students assessed in the retake could only obtain an Honors mark if all the Honors available have not been allocated after the first opportunity assessment.<br><br>Scheduled activities dates:-First opportunity: to be established. Check published information of the Faculty.-Second opportunity: to be established. Check published information of the Faculty. |

| Sources of information | |
|---|---|
| Basic | - Travis, J. and Kring, J. (2008). LabVIEW for Everyone Graphical Programming Made Easy and Fun. Prentice Hall<br>- del Río Fernández, J; Shariat-Panahi, S.; Sarriá Gandul, D. y Lázaro, A.M. (2011). LabVIEW Programación para sistemas de instrumentación. Garceta<br>- Various (2000-2014). Reports and colaboration papers from National Instruments, in PDF and PPS format (restricted sharing in the asignature web cloud). |
| Complementary | |

| Recommendations |
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| Subjects that it is recommended to have taken before |
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| Subjects that are recommended to be taken simultaneously |
| Química Física Avanzada/610G01020 |
| Subjects that continue the syllabus |
| Química Física 1/610G01016<br>Química Física 2/610G01017<br>Química Física 3/610G01018 |
| Other comments |
| The information sources are usually written in english, so not english-speaking students should have at least an average level of understanding of this language. |