



| Teaching Guide           |   |        |                     |         |
|--------------------------|---|--------|---------------------|---------|
| Identifying Data         |   |        |                     | 2018/19 |
| Subject (*)              | Molecular Biology   | Code   | 610509117           |         |
| Study programme          | Mestrado Universitario en Investigación Química e Química Industrial (Plan 2017)  |        |                     |         |
| Descriptors              |   |        |                     |         |
| Cycle                    | Period  | Year   | Type                | Credits |
| Official Master's Degree | Yearly  | First  | Optional            | 3       |
| Language                 | Spanish   |        |                     |         |
| Teaching method          | Face-to-face  |        |                     |         |
| Prerequisites            |   |        |                     |         |
| Department               | Biología  |        |                     |         |
| Coordinador              | Lamas Maceiras, Mónica  | E-mail | monica.lamas@udc.es |         |
| Lecturers                | Cerdan Villanueva, Maria Esperanza  | E-mail | esper.cerdan@udc.es |         |
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| Web                      | www.usc.es/gl/centros/quimica/curso/master.html   |        |                     |         |
| General description      | This course contains basic and fundamental concepts of research methods on biological processes that are performed on living cells. |        |                     |         |

| Study programme competences / results |  |
|---------------------------------------|--|
| Code                                  | Study programme competences / results  |
| A1                                    | Define concepts, principles, theories and specialized facts of different areas of chemistry.   |
| A3                                    | Innovate in the methods of synthesis and chemical analysis related to the different areas of chemistry   |
| A4                                    | Apply materials and biomolecules in innovative fields of industry and chemical engineering.  |
| B1                                    | Possess knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, often within a research context                       |
| B4                                    | Students should be able to communicate their conclusions, and the knowledge and the reasons that support them to specialists and non-specialists in a clear and unambiguous manner |
| B5                                    | Students must possess learning skills to allow them to continue studying in a way that will have to be largely self-directed or autonomous.  |
| B7                                    | Identify information from scientific literature by using appropriate channels and integrate such information to raise and contextualize a research topic                           |
| B10                                   | Use of scientific terminology in English to explain the experimental results in the context of the chemical profession   |
| B11                                   | Apply correctly the new technologies to gather and organize the information to solve problems in the professional activity.  |
| C1                                    | CT1 - Elaborar, escribir e defender publicamente informes de carácter científico e técnico   |
| C3                                    | CT3 - Traballar con autonomía e eficiencia na práctica diaria da investigación ou da actividade profesional.   |
| C4                                    | CT4 - Apreciar o valor da calidade e mellora continua, actuando con rigor, responsabilidade e ética profesional.   |

| Learning outcomes   |  |                                       |         |
|---|--|---------------------------------------|---------|
| Learning outcomes   |  | Study programme competences / results |         |
| Knowing the basics for the isolation , cloning , expression and purification of proteins. |  | AC1                                   | BC1 CC1 |
| Learn the basic techniques used to visualize biological processes in cell                 |  | AC3                                   | BC4 CC3 |
|   |  | AC4                                   | BC5 CC4 |
|   |  |                                       | BC7     |
|   |  |                                       | BC10    |
|   |  |                                       | BC11    |

| Contents |           |
|----------|-----------|
| Topic    | Sub-topic |
|          |           |



|   |   |
|---|---|
| <p>ITEM 1. Handling and DNA sequencing.</p> <p>1. Sense of the subject (Introduction)</p> <p>This topic will address the description of the main tools and methods to manipulate genetic information and verify that the operations have been successful and have been conducted as they are designed .</p> | <p>2. Wording of the subject.</p> <p>Restriction enzymes and cloning vectors hybridization for the detection of specific sequences, PCR, DNA sequencing.</p> <p>3. Bibliography</p> <ul style="list-style-type: none"> <li>- Molecular Biology of the Cell fifth edition ( 2008 ) . Alberts et al. Garland Science. Chapter 8.</li> <li>- Molecular Biology fourth edition (2008 ) . Robert F. Weaver. McGraw -Hill International Edition. Chapters 4 and 5.</li> </ul> <p>4. Activities to develop.</p> <p>During the development of the subject practical cases that students must solve using the knowledge gained will arise. It could also be considered that students will read scientific articles related to the topic for exhibition / public presentation.</p>  |
| <p>ITEM 2. Techniques for obtaining and analyzing proteins.</p> <p>1. Sense of the subject (Introduction)</p> <p>We look at how, using the techniques seen in item 1, we can produce and purify proteins in the lab for testing its activity, determine its structure, etc.</p>                             | <p>2. Wording of the subject.</p> <p>Recombinant proteins , labeling of proteins, protein expression and purification , and protein sequencing analysis .</p> <p>3. Bibliography</p> <ul style="list-style-type: none"> <li>- Molecular Biology of the Cell fifth edition ( 2008 ) . Alberts et al. Garland Science. Chapter 8.</li> <li>- Molecular Biology fourth edition (2008 ) . Robert F. Weaver. McGraw -Hill International Edition. Chapters 4 and 5.</li> </ul> <p>4. Activities to develop.</p> <p>During the development of the subject practical cases that students must solve using the knowledge gained will arise. It could also be considered that students will read scientific articles related to the topic for exhibition / public presentation.</p> |
| <p>ITEM 3. Viewing biological processes.</p> <p>1. Sense of the subject (Introduction)</p> <p>In this issue the main methods of display structures and biological processes, both in vivo and in vitro will be explained.</p>   | <p>2. Wording of the subject.</p> <p>Chemical markers , GFP and fluorescent fusion proteins , optical microscopy (confocal, super-resolution, real-time ), electron microscopy.</p> <p>3. Bibliography</p> <ul style="list-style-type: none"> <li>- Molecular Biology of the Cell fifth edition (2008). Alberts et al. Garland Science. Chapter 9.</li> </ul> <p>4. Activities to develop.</p> <p>During the development of the subject practical cases that students must solve using the knowledge gained will arise. Also scientific work to read an comment by the students.</p>  |

| Planning                        |                          |                                      |                               |             |
|---------------------------------|--------------------------|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests           | Competencies / Results   | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Problem solving                 | A1 A4 A3 B1 B5 B11<br>C3 | 7                                    | 10                            | 17          |
| Seminar                         | B4 B7 B10 C1 C4          | 2                                    | 8                             | 10          |
| Mixed objective/subjective test | A1 A4 B1 B4 C3 C4        | 1                                    | 36                            | 37          |
| Guest lecture / keynote speech  | B5 C4                    | 11                                   | 0                             | 11          |
| Personalized attention          |                          | 0                                    |                               | 0           |

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

| Methodologies |             |
|---------------|-------------|
| Methodologies | Description |



|                                 |  |
|---------------------------------|--|
| Problem solving                 | Theoretical / practical class in which the teacher propose and students solve applications of theory, problems and applied questions. It may also include the presentation by students of a topic related to the subject.<br>Small group interactive classes seminars , &quot; S &quot; in the timetables)   |
| Seminar                         | Tutorials in very small group (&quot;T&quot; in the timetables ) planned by the teacher and coordinated by the Tutoring Center. In general, each student will account for two hours per semester and subject. Monitoring activities as directed exercises, clarification of doubts about theory, problems, exercises, readings or other proposed tasks. Also the presentation, discussion or comments in small groups. Attendance at these classes is mandatory. |
| Mixed objective/subjective test | Test to evaluate skills and knowledge  |
| Guest lecture / keynote speech  | Lesson taught by the teacher who may have different formats (theory, problems and / or general examples, general guidelines on the matter ... ). The teacher may have the support of audiovisual and computer media but, in general, students do not need to handle them in class.   |

**Personalized attention**

| Methodologies              | Description  |
|----------------------------|--|
| Problem solving<br>Seminar | Students with part-time dedication or waiver of presence should contact the teachers of the subject in the early going to establish a schedule of activities to acquire and evaluate in a complementary way the competences. |

**Assessment**

| Methodologies                   | Competencies / Results | Description                                | Qualification |
|---------------------------------|------------------------|--|---------------|
| Guest lecture / keynote speech  | B5 C4                  | Evaluation of attendance and participation | 10            |
| Problem solving                 | A1 A4 A3 B1 B5 B11 C3  | Continuous assessment                      | 5             |
| Seminar                         | B4 B7 B10 C1 C4        | Continuous assessment                      | 15            |
| Mixed objective/subjective test | A1 A4 B1 B4 C3 C4      | Final evaluation                           | 70            |

**Assessment comments**

|  |
|--|
| <p>Evaluation procedure.</p> <p>The assessment of this will be done through continuous assessment and the completion of a final exam. The access to the exam requires participation in at least 80% of classroom and teaching compulsory attendance activities (seminars and tutorials).</p> <p>Continuous assessment (N1) will weigh 40% in the total of the course and consist of two components: interactive small group classes (seminars) and interactive classes in very small groups (tutorials). Seminars and tutorials may include exercises and assignments made in person, exercises submitted to the teacher or public presentations of topics previously selected.</p> <p>The final exam (N2) will cover the entire content.</p> <p>The student's score, will be obtained as a result of applying the following formula:</p> <p>End = maximum Note (0.4 x 0.6 x N1 + N2, N2)</p> <p>N1 is the corresponding to the continuous assessment (scale 0-10) and N2 numerical final exam (0-10 scale numerical grade).</p> <p>Students with part-time dedication or waiver attendance may choose to be evaluated in a final exam if they do not qualify for continuous evaluation.</p> |
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**Sources of information**

|                      |   |
|----------------------|---|
| <b>Basic</b>         | Básica (manuais de referencia). Molecular Biology of the Cell (Alberts y otros, Garland Science, sexta edición, 2015)<br>Complementaria. Molecular Biology (Weaver, McGraw Hill Higher Education, quinta edición, 2015) |
| <b>Complementary</b> |   |



## Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

## Other comments

It is necessary to know the different kinds of biomolecules and processes of transfer of genetic information in cells. It is very important to attend the lectures.

It is essential to keep the study of matter " up to day".

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.