COURSE GUIDE FOR
HUMAN AND CELL PHYSIOLOGY

Academic year 2020-2021
(Date last update: 08/07/2020)
(Date approved in Department Council: 08/07/2020)

<table>
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<tr>
<th>MODULE</th>
<th>SUBJECT MATTER</th>
<th>YEAR</th>
<th>SEMESTER</th>
<th>CREDITS</th>
<th>TYPE</th>
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<tbody>
<tr>
<td>BASIC COMMON KNOWLEDGE</td>
<td>HUMAN AND CELL PHYSIOLOGY</td>
<td>1st</td>
<td>2nd</td>
<td>6</td>
<td>Obligatory course</td>
</tr>
</tbody>
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**TEACHING STAFF**(1)

<table>
<thead>
<tr>
<th>ADDRESS, TELEPHONE NUMBER, EMAIL, ETC. Directación completa de contacto para tutorías (Dirección postal, teléfono, correo electrónico, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Physiology, 1st Floor, Faculty of Pharmacy, Phone number: +34 958 243879</td>
</tr>
<tr>
<td>Prof. Diaz Castro:</td>
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<tr>
<td>Phone number: +34 958 243884,</td>
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<td>Office 151.</td>
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<tr>
<td>E-mail: <a href="mailto:javierdc@ugr.es">javierdc@ugr.es</a></td>
</tr>
<tr>
<td>Website: <a href="http://www.ugr.es/local/javierdc">http://www.ugr.es/local/javierdc</a></td>
</tr>
<tr>
<td>Prof. Romero Márquez:</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:romeromarquez@ugr.es">romeromarquez@ugr.es</a></td>
</tr>
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</table>

- Javier Díaz Castro (T*: Theory; P*: Practice)
- José Manuel Romero Márquez (P*)

Timetable for tutorials or link to website

Tutorships can be consulted at the following link:
https://www.ugr.es/~fisiougr/tutorias.php

FIRST TERM:
Monday, Wednesday, Friday: 9:30-11:30 h
SECOND TERM:
Tuesday: 16:00-18:00 h
Wednesday: 17:00-18:00h
Thursday: 16:00-18:00h
Friday: 16:00-17:00h

1 Consult any updates in Acceso Identificado > Aplicaciones > Ordenación Docente

(’) This course guide should be filled in according to UGR regulations on assessment of student learning:
(http://secretariageneral.ugr.es/pages/normativa/fichasugr/ng7121/)
It is recommendable to communicate via e-mail (javierdc@ugr.es) that the student will attend to the tutorship to optimize the meetings and avoid delays due to the attendance of more students.

Prof. Romero Márquez:
FIRST AND SECOND TERM:
Tuesday, Wednesday, Thursday: 10:30-12:30 h
Wednesday: 16:00-17:00 h y 18:00-19:00 h

<table>
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<tr>
<th>BELONGS TO UNDERGRADUATE DEGREE PROGRAMME</th>
<th>AND ALSO TO OTHER UNDERGRADUATE DEGREE PROGRAMMES</th>
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<tbody>
<tr>
<td>Degree in Food Science and Technology</td>
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PREREQUISITES OR RECOMMENDATIONS (where applicable)

- Prerequisites: those necessary to access to the degree, related with the level of formation that the student must acquire to accede to the University.
- Recommendations: to have previous basic knowledge (background knowledge of Chemistry, Anatomy and Histology, Biochemistry, Metabolism.
- A good standard of English and informatics skills are also required.

BRIEF DESCRIPTION OF CONTENT (ACCORDING TO OFFICIAL VALIDATION REPORT)

The program has a high degree of coherence and integration and cover a diverse range of topics, while reflecting particular strengths within the biological and life sciences and there is a clear coherence between the different modules. Physiology is a study of the normal functions of cells, organs and systems of the living body, the mechanisms by which they are achieved and the regulation of functional activities to maintain the homeostasis, therefore the program has been divided into thematic units just for didactic purposes, but during the course we will integrate all the body systems defining their links to maintain the homeostasis.

GENERAL AND SPECIFIC COMPETENCES

Physiology is a study of the normal functions of cells, organs and systems of the living body, the mechanisms by which they are achieved and the regulation of functional activities. A firm grasp of its principles is essential not only for the study of successive courses, but also for students’ future professional career after graduation. Selection of the teaching material will be in accordance with the necessity of professional education and will be laid emphasis on basic theories and knowledge of physiology as well as on the training of basic techniques. Attention will also be paid to promote the ability of scientific thinking of the students. In order to foster the students’ ability of studying physiology, we conduct our teaching with several methods, such as self-study, exhibition in small groups and tutoring instead of to be given only by lecturer in the classroom. The lifelong learning to obtain more and better competences requires new pedagogical practices and the emergence of new scenarios for the students in where multimedia shall play a predominant role in our program. Therefore, multimedia resources will be using our methodological teaching-learning process in the classroom. Cooperative learning networks will be built and innovative teaching-learning strategies will be used to complement the traditional classes.

OBJECTIVES (EXPRESSED AS EXPECTED LEARNING OUTCOMES)

Cognitive objectives:
- Understand and analyze the interactions between nervous system, cellular communication and its relation to human homeostasis.
- Study, understand and analyze the physiological roles of all the body systems and its integration to maintain homeostasis.

**Procedural aims:**
- Know properly use terms and concepts of matter and expressed in a correct and accurate.
- Deduct, identify and describe the physiological effects of body systems to maintain a stable, constant condition in the human body.
- Deduct, interpret and evaluate critically experimental results.
- Know the main documentary sources of the discipline of developing the ability to complete and update knowledge in the future.

**Attitudinal objectives:**
- Determine the complex interactions to maintain balance or return systems to functioning within a normal range.
- A scientific approach to the study and explanation of physiological phenomena in the domain of scientific knowledge.

**DETAILED SYLLABUS**

We will use several multimedia instruments during the course to enhance the teaching-learning process of the student. The subject has been designed taking into account the integration concept and cover a diverse range of physiological topics, with a clear coherence between the different modules. Physiology is a study of the normal functions of cells, organs and systems of the living body, the mechanisms by which they are achieved and the regulation of functional activities to maintain the homeostasis, therefore the program has been divided into thematic unit just for didactic purposes, although during the course we will integrate all the body systems, to understand better how they maintain a stable, constant condition.

**THEMATIC UNIT I: INTRODUCTION AND CELL PHYSIOLOGY**
- Module 1: Introduction to Physiology. Concept and homeostasis. (0.5)
- Module 2: Cell functioning. Cell membrane. Transport towards cell membrane. (1h)

**THEMATIC UNIT II. NERVOUS SYSTEM**
- Module 3: Resting membrane potential and action potential. Excitability. (1.5h)
- Module 4: Nervous cells. Synaptic transmission. (1h)
- Module 5: Organization of the nervous system. (1h)
- Module 6: Physiology of sensory organs. (3h)
- Module 7: Motor control. (0.5h)
- Module 8 Nervous autonomic system. (2h)
- Module 9: Superior functions of the nervous system. (0.5h)
- Module 10: Skeletal and visceral muscle physiology. (2h)

**THEMATIC UNIT III. BODY FLUIDS AND BLOOD**
- Module 11: Body Fluids. Blood. (1h)
- Module 12: Blood cells. Haematopoiesis (2h)
- Module 13: Hemostasis and coagulation. (0.5h)

**THEMATIC UNIT IV. ENDOCRINE SYSTEM**
- Module 14: Neuroendocrine integration. (1.5h)
- Module 15: Thyroid gland physiology. (1h)
Module 16: Endocrine regulation of growth and protein metabolism. (1h)
Module 17: Endocrine regulation of glucidic and lipid metabolism. (1.5h)
Module 18: Endocrine regulation of ionic/salt and water balance. (0.5h)
Module 19: Endocrine regulation of calcium and phosphorus metabolism. (1h)

THEMATIC UNIT V. CARDIOVASCULAR SYSTEM
Module 20: The heart. Electrocardiography. (1h)
Module 21: Cardiac cycle and cardiac output. (1.5h)
Module 22: General circulation and microcirculation. (1h)
Module 23: Cardiovascular regulations. (1.5h)

THEMATIC UNIT VI. RESPIRATORY SYSTEM
Module 24: Morphologic and functional structure of the respiratory system. Ventilation. (0.5h)
Module 25: Transport and exchange of respiratory gases. (0.75h)
Module 26: Nervous and chemical control or the respiratory process. (0.75h)

THEMATIC UNIT VII. RENAL SYSTEM
Module 27: Morphologic and functional structure of the renal system. (1h)
Module 28: Urine formation, concentration and dilution. (0.5h)
Module 29: Regulation of the acid-base balance. (0.5)

THEMATIC UNIT VIII. DIGESTIVE SYSTEM
Module 30: Morphologic and functional structure of the digestive system. Motility. (1h)
Module 31: Digestive secretions. Nutrient metabolism (2.5h)
Module 32: Digestion and absorption. (1.5h)

THEMATIC UNIT IX. REPRODUCTIVE FUNCTION
Module 33: Morphologic and functional structure of the reproductive system. (1.5h)
Module 34: Fecundation, childbirth and breastfeeding. (0.5h)

THEMATIC UNIT X. INTEGRATION
Module 35: General adaptation syndrome. (1h)

PRACTICAL LABORATORY CLASSES
Group work sessions in the laboratory supervised by the lecturer. Meaningful construction of knowledge through interaction and student activity.

The practical classes at the laboratory will be taught as follows:

- Practical Session 1. Physical and chemical aspects of the digestive process (1.5h)
- Practical Session 2. Blood cell count and morphology by mean of the optical microscope (3h)
- Practical Session 3. Respiratory system assessment by mean of spirometry (1.5h)
- Practical Session 4. Blood Pressure assessment completed with a software simulation. (1.5h)
- Practical Session 5. Glycemic profile (1.5h)
- Practical Session 6. Functional anatomy of the human body. (1.5h)
- Practical Session 7. Blood groups and rh study and assessment. (1.5h)

BIBLIOGRAPHY

Print Books on Physiology

Print Journals
- American Journal of Physiology.
- Canadian Journal of Applied Physiology.
- European Journal of Applied Physiology.
- Annual Review of Physiology.
- Handbook of Physiology.
- News in Physiological Reviews.

RECOMMENDED LINKS
- Advances in Physiology Education (DOAJ)
- American Journal of Physiology (EBSCO Open Access)
- BMC Physiology (DOAJ)
- Experimental Physiology (Cambridge) (EBSCO Open Access)
- Journal of Applied Physiology (Free Medical Journals)
- Nephron – Physiology (Academic Search Premier)
- Journal of Physiology (Free Medical Journals)
- The Journal of General Physiology (Free Medical Journals)
- Origination of Organismal Form: Beyond the Gene in Developmental and Evolutionary Biology/ Vienna Series in Theoretical Biology, 2003. (netLibrary)
- Purkinje’s Vision: The Dawning of Neuroscience/ Nicholas Wade, Josef Brozek, JirA Hoskovek, 2001.(netLibrary)

TEACHING METHODOLOGY
We feature a program with a high degree of coherence and integration, which covers the needs of the student of the Degree in Food Science and Technology. The theoretical contents of the program will be developed through a
combination of teaching techniques that we intend to be educational and innovative. In the first place, most of the theoretical topics will be presented in the classical way through master classes by the teacher himself, but taking advantage of information and communication technologies (ICTs) to facilitate the teaching-learning process. A small selection of the agenda will be presented by the students themselves, using for their preparation part of the autonomous work that they must carry out in person. This work will be supervised at all times by the teacher. During the course, face-to-face tutoring as well as interactivity through digital platforms will abound.

THEORETICAL CLASSES:
- Exposition of the subject in master classes by the professor, with introduction of the different sections that make up the subject, breakdown of the points to be dealt with in the development of the subject and its extension.
- Multimedia teaching material will be included in the exposition of the master classes, to facilitate the understanding of those more complex physiological phenomena for the students.
- Proposal for consultation sources (texts, published works, specialized magazines, web page addresses, etc.), in which to search for information for the various topics of the program.

Directed exhibitions and seminars:
- Classroom presentation of the topics prepared by the students. The topics will be distributed among the students with enough time in advance for them to prepare and be supervised by the teacher before the exhibition, during which the debate among the students will be encouraged, with the teacher of the subject acting as moderator.
- Study, commentary and discussion on practical cases related to the Physiology of specific systems and devices.
- Tutorials: periodic meetings in specific tutorials where to solve doubts or concerns raised by the students.
- Seminars, which are intended to deal with those topics not directly included in the program but that are of interest to the student.

PRACTICAL CLASSES:
The professor will explain and carry out the practice before a small group of students, then the student will carry out the practice individually supervised by the teacher and will complete the different activities proposed in the practice notebook. In these classes it is intended that the student acquire fluency in instrumental handling and learn to solve problems derived from working in the laboratory. At the end, he will deliver the notebook with the results obtained individually, in addition to collecting the different experimental observations. This notebook will be corrected by the professor and will be returned to the student with the corresponding qualification.

ASSESSMENT (ASSESSMENT INSTRUMENTS, CRITERIA AND PERCENTAGE VALUE OF FINAL OVERALL MARK, ETC.)

This is the default system. Continuous Assessment includes several theory exams which will take place on dates scheduled by the Faculty in coordination with the other subjects offered in the term. Prior to the exam, the lecturer will describe the structure and type of exam questions. Coursework performed by the students (essays, presentations, seminars…) as well as regular attendance and class participation will be also assessed.

The final mark will be calculated according to the following:
- Theory: 70%
- Laboratory practice: 10%
- Coursework (presentations, seminars, etc.) and attendance to theoretical classes: 20%

A minimum mark of 5 (out of 10) in both the theory and laboratory practice sections must be obtained in order to pass the subject.

DESCRIPTION OF THE EXERCISES WHICH WILL CONSTITUTE SINGLE FINAL ASSESSMENT AS ESTABLISHED
IN UGR REGULATIONS

According to the Regulations of evaluation and qualification of the students of the University of Granada. Consolidated text of the Regulations approved by the Agreement of the Governing Council of May 20, 2013 (BOUGR No. 71, of May 27, 2013) and amended by the Agreements of the Governing Council of February 3, 2014 (BOUGR no. 78, of February 10, 2014); June 23, 2014 (BOUGR No. 83, June 25, 2014) and October 26, 2016 (BOUGR No. 112, November 9, 2016); Includes bug fixes for December 19, 2016 and May 24, 2

By virtue of this, the allocation of points in the final single evaluation system will be made according to the percentages: Theoretical classes: 90% Practical classes: 10%, with the following specifications:

- Evaluation of the theoretical contents: Students will be evaluated by taking a final exam that proves that the student has acquired the completeness of the skills described in the teaching guide.

- Evaluation of laboratory practices. Students must pass a practical exam that will consist of completing one of the practices included in the randomly selected Department practice notebook and answering questions asked by the teacher about the different practices and the assessment of the practice notebook. The practice mark will account for 10% of the final grade.

ADDITIONAL INFORMATION

It will be an essential condition to pass the subject, both in the continuous assessment and in the only final, to have a minimum grade of 5 points out of 10 in both theoretical and practical teaching. In no case will the marks obtained in the continuous evaluation in the sections for the realization and presentation of works, assists with achievement or any other evaluable component that appears in the teaching guide, will serve to pass the subject and will only contribute to the final mark of the same. once the theoretical and practical parts have been approved.

The teaching methodology and the evaluation will be adapted to students with specific needs, in accordance with Article 11 of the Regulations for the Evaluation and Qualification of students of the University of Granada, published in the Official Gazette of the University of Granada of November 9, 2016

SCENARIO A (ON-CAMPUS AND REMOTE TEACHING AND LEARNING COMBINED)

TUTORIALS

<table>
<thead>
<tr>
<th>TIMETABLE</th>
<th>TOOLS FOR TUTORIALS</th>
</tr>
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<tbody>
<tr>
<td>(According to Official Academic Organization Plan)</td>
<td>(Indicate which digital tools will be used for tutorials)</td>
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</tbody>
</table>

Tutorships can be consulted at the following link: http://www.ugr.es/~fisiougr/tutorias.php

- Videoconference (Google Meet)
- E-mail
- PRADO forums
- Teaching communications

MEASURES TAKEN TO ADAPT TEACHING METHODOLOGY

- Royal Decree-Law 21/2020, of June 9, on urgent measures of prevention, containment and coordination to face the health crisis caused by COVID-19, establishes in its article 9 that in educational centers, including University students must guarantee the adoption of organizational measures, avoid crowds and ensure that a safety distance is maintained, maintaining on campus
teaching.

- When it is not possible to maintain this safety distance, adequate hygiene measures will be observed to prevent the risks of contagion. If it is not possible to maintain social distance in the classrooms, each theory group will be divided in two and on campus teaching will be given in alternate weeks to each subgroup while the other subgroup receives teaching via streaming.
- For practical teaching, the explanation of the theoretical foundations may be taught online, while the practical part will subdivide the groups to do it in person in the laboratory, keeping the distance of safety and hygiene measures.

MEASURES TAKEN TO ADAPT ASSESSMENT (Instruments, criteria and percentage of final overall mark)

Ordinary assessment session

During the 2020-2021 academic year, as indicated in the Regulations for the evaluation and qualification of students of the University of Granada (article 6, point 2), the evaluation will preferably be continuous. The final evaluation tests of the subjects that were foreseen in the teaching guide will preferably be carried out in person, taking into account the level of occupation of the space authorized by the health authorities. The non-face-to-face assessment tests will include mechanisms for guaranteeing their authorship by the students. In any case, adequate legal and security guarantees will always be preserved, with respect for the fundamental rights to intimacy and privacy, observing the principle of proportionality.

This is the default system. Continuous Assessment includes several theory exams which will take place on dates scheduled by the Faculty in coordination with the other subjects offered in the term. Prior to the exam, the lecturer will describe the structure and type of exam questions. Coursework performed by the students (essays, presentations, seminars…) as well as regular attendance and class participation will be also assessed.

- The final mark will be calculated according to the following:
  - Theory: 70%
  - Laboratory practice: 10%
  - Coursework (presentations, seminars, etc.), and attendance to theoretical classes: 20%

A minimum mark of 5 (out of 10) in both the theory and laboratory practice sections must be obtained in order to pass the subject.

Extraordinary assessment session

- Same measures as in the adaptation of the evaluation in ordinary call

SCENARIO B (ONCAMPUS ACTIVITY SUSPENDED)

TUTORIALS

TIMETABLE
(According to Official Academic Organization Plan) | TOOLS FOR TUTORIALS
(Indicate which digital tools will be used for tutorials)

| The tutorials are given at the same times that it was done in person. Exceptionally, when this is not possible, the students will have meetings in a new schedule from 2:30 p.m. or 7:00 p.m. In addition, emails are attended to students at any time, for specific questions. | Videoconference (Google Meet) |
| | E-mail |
| | PRADO forums |
| | Teaching communications |
### MEASURES TAKEN TO ADAPT TEACHING METHODOLOGY

- **Theoretical Teaching:** classes are held on-line synchronous videoconference through the Google Meet platform at the same times that they had been taught in person.
- **Practical Teaching:** students are called through PRADO or teaching communication and a Google Meet link is created to teach these practices.
- Use of the PRADO platform with support material for theory and practices and activities for monitoring continuous assessment.

### MEASURES TAKEN TO ADAPT ASSESSMENT (Instruments, criteria and percentage of final overall mark)

#### Ordinary assessment session

- **Theoretical Teaching:**
  Classes are held on-line synchronous videoconference through the Google Meet platform at the same times that they had been taught on campus. Oral exam online through Google Meet: The exam will be done by Videoconference with Google Meet, with the same percentages as in the ordinary assessment. The allocation of points in the evaluation system will be made according to the percentages: 70% of the final grade will be the theoretical exam, 10% the practices and 20% continuous evaluation activities + seminars.

- **Practical Teaching:**
  Online questionnaires through the PRADO-EXAMEN platform. It will consist of a test (60% of the grade with a structure similar to the theory exam) and the questions from the practical notebook adapted to the new teaching methodology (40% of the grade) that is sent to students in a single file, through PRADO or teaching communication.

- Students who have not completed or have not passed the practices will be called for a practice exam on the day of the theory exam.

- To evaluate both theoretical and practical teaching in the event of a connection failure, another time will be agreed on the same day. In case it fails again, another day will be agreed in the form of individualized online oral test.

#### Extraordinary assessment session

- Oral exam online through Google Meet: The exam will be done by Videoconference with Google Meet, with the same percentages as in the ordinary assessment.

- To evaluate both theoretical and practical teaching in the event of a connection failure, another time will be agreed on the same day. In case it fails again, another day will be agreed in the form of individualized online oral test.

- Students who have not completed or have not passed the practices will be called for a practice exam on the day of the theory exam.

- Students will always take a theory exam that will be evaluated over 70%. The qualification will be obtained by applying the same criteria specified in the ordinary call.

#### Single final assessment

- Oral exam online through Google Meet: The exam will be done by Videoconference with Google Meet.

- Students will be called for a practical exam on the day of the theoretical exam (10% of the final grade).

- The allocation of points in the evaluation system will be made according to the percentages: 70% of the final grade will be the theoretical exam, which must be completed to get the 90%, and 10% corresponds
- Both to evaluate the theoretical teaching as well as the practical teaching in the event of a connection failure, another time will be agreed on the same day. In case it fails again, another day will be agreed in the form of individualized online oral test.

**ADDITIONAL INFORMATION** (if necessary)

In the event of suspension of on campus teaching, the students of the single final evaluation may request to join virtual teaching, since the difficulties they claimed to not follow the continuous evaluation will have disappeared.