

**1. General information****Course:** MICROBIOLOGY**Type:** CORE COURSE**Degree:** 332 - UNDERGRADUATE DEGREE PROGRAMME IN MEDICINE**Center:** 9 - FACULTY OF MEDICINE OF CIUDAD REAL**Year:** 2**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 34314**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 20**Duration:** AN**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** MARIA SOLEDAD ILESCAS FERNANDEZ-BERMEJO - Group(s): 20

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**2. Pre-Requisites**

Not established

**3. Justification in the curriculum, relation to other subjects and to the profession**

The subject "Microbiology" belongs to Module IV (Diagnostic and Therapeutic Procedures) and to Subject 4.5 (Diagnostic and Therapeutic Procedures) of the Teaching Plan of Medicine. It is a compulsory subject, with 6 ECTS and is taught annually in the second year of the Degree.

The Study Plan of the Degree in Medicine is adapted to the requirements established in the Royal Decree 1393/2007, of October 29th (B. O. E. of October 30th, 2007), in the Order ECI/332/2008, of February 13th (B. O. E. of February 15th, 2008) and in the agreements adopted by the Medicine Degree Commission of May 28th, 2008 and June 30th, 2008.

The degree of Graduate in Medicine consists, according to current legislation, of 360 ECTS distributed over 6 academic years and structured in at least 5 modules, with defined competences, as the medical profession is a regulated profession. The five modules of common subjects are defined by the content of the subjects that include compulsory subjects for the degree of Graduate in Medicine. The sixth module has been defined according to the optional nature of the subjects that comprise it. In the first two years of the degree, the necessary basic preclinical subjects are taught (Modules 1 and 2) that will provide students with the necessary elements for the foundation of clinical knowledge and the medical skills they will later acquire (Modules 3, 4, 5 and 6), promoting the early insertion of students in health centers.

The learning of Microbiology is established around theoretical and practical contents, oriented to the acquisition of the competences defined in Module 4, according to the Memory approved by ANECA for the Degree of Medicine of this University.

Relationship with other subjects: it will be necessary to have passed the subject "Microbiology" in order to pass the 4th year subjects "Diseases caused by External Agents: Infections and Intoxications", as well as the Subjects M3.2 (Human Pathology I), M3.3 (Human Pathology II), M3.4 (Skin Pathologies), M3.5 (Ophthalmological Pathologies), M3.6 (Pathologies of the ear, nose and throat) and M3.8 (Maternal and child health, reproduction and gynecological pathology).

**4. Degree competences achieved in this course****Course competences**

| Code | Description                                                                                                                                                                                                                                                         |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.1  | Assess the risk/benefit ratio of diagnostic and therapeutic procedures.                                                                                                                                                                                             |
| 4.39 | Know how to interpret the results of laboratory diagnostic tests.                                                                                                                                                                                                   |
| 4.8  | To know the basics of microbiology and parasitology.                                                                                                                                                                                                                |
| 4.9  | To know the main microbiological and parasitological diagnostic techniques and to interpret the results.                                                                                                                                                            |
| G06  | Develop professional practice with respect to other health professionals, acquiring teamwork skills.                                                                                                                                                                |
| G09  | Understand and recognize the effects, mechanisms and manifestations of the disease on the structure and function of the human body.                                                                                                                                 |
| G10  | Understand and recognize the causative agents and risk factors that determine health states and the development of the disease.                                                                                                                                     |
| G12  | Understand the fundamentals of action, indications and efficacy of therapeutic interventions, based on the available scientific evidence.                                                                                                                           |
| G13  | Obtain and prepare a clinical history containing all relevant information.                                                                                                                                                                                          |
| G14  | Perform a physical exam and a mental assessment.                                                                                                                                                                                                                    |
| G15  | Have the ability to make an initial diagnostic judgment and establish a reasoned diagnostic strategy.                                                                                                                                                               |
| G17  | Establish the diagnosis, prognosis and treatment, applying the principles based on the best possible information and in conditions of clinical safety.                                                                                                              |
| G18  | Indicate the most appropriate therapy for the most prevalent acute and chronic processes, as well as for terminally ill patients.                                                                                                                                   |
| G19  | To propose and propose the appropriate preventive measures for each clinical situation.                                                                                                                                                                             |
| G20  | Acquire adequate clinical experience in hospitals, health centers or other health institutions, under supervision, as well as basic knowledge of patient-centered clinical management and appropriate use of tests, drugs and other resources of the health system. |
| G33  | Maintain and use records with patient information for subsequent analysis, preserving the confidentiality of the data.                                                                                                                                              |

## 5. Objectives or Learning Outcomes

### Course learning outcomes

Description

Assess the risk/benefit ratio of diagnostic and therapeutic procedures.

Learning to design and organize the work. Acquiring habits of perseverance in the study.

Acquisition of oral and/or written presentation and communication skills.

Diagnose with laboratory and imaging methods the main human pathologies.

### Additional outcomes

More specifically, at the end of the Microbiology course, students should be able to:

i) Knowing the basic microbiological taxonomy, which includes bacteria, viruses, fungi and parasites, with more emphasis on the most relevant microorganisms in clinical microbiology (G9, G10, 4.8.).

ii) Knowing the basic aspects of the different microorganisms in relation to their structure, their main reservoir (human, animal or environmental), why they are pathogenic (virulence factors), citing what diseases they produce, how they can be controlled and/or prevent (if they have treatment and/or vaccine prophylaxis), etc. (G12, 4.8.).

iii) Knowing how to diagnose and interpret the laboratory tests used in microbiological and parasitological diagnosis (G13-G17, 4.9., 4.39.)

iv) Apply all the acquired knowledge to solve simple clinical approaches based on microbiology aspects only: collecting clinical samples correctly for microbiological diagnosis, how to process such samples and how to interpret the results (G18, 4.1, 4.9., 4.39.).

## 6. Units / Contents

### Unit 1: Introduction to Microbiology

**Unit 1.1** Bacterial Morphology/Structure

**Unit 1.2** Microbial pathogenesis. Virulence

**Unit 1.3** Bacterial genetics. Plasmids

**Unit 1.4** Metabolism and nutrition.

### Unit 2: Microbiological diagnosis. Antimicrobials

**Unit 2.1** Microbiology laboratory and microbiological safety concepts

**Unit 2.2** Microbiological Diagnostic Techniques

**Unit 2.3** Antibiotics; antibiotic resistance

### Unit 3: Bacteriology I

**Unit 3.1** Enterobacteriaceae

**Unit 3.2** Curved Gram-negative Bacilli

**Unit 3.3** Gram-negative Cocci

### Unit 4: Bacteriology II

**Unit 4.1** Fastidious Gram-negative Bacteria (human)

**Unit 4.2** Fastidious Gram-negative Bacteria (zoonotic)

**Unit 4.3** GN non-fermentative - nosocomial

**Unit 4.4** Anaerobes

### Unit 5: Bacteriology III

**Unit 5.1** Spirochetes

**Unit 5.2** Obligated intracellular bacteria

**Unit 5.3** Mycoplasmas

### Unit 6: Bacteriology IV

**Unit 6.1** Mycobacteria and related

**Unit 6.2** Gram-positive cocci

**Unit 6.3** Gram-positive bacilli

### Unit 7: Virology I

**Unit 7.1** Introduction to virology

**Unit 7.2** Herpesviruses

**Unit 7.3** Respiratory and digestive viruses

**Unit 7.4** Arboviruses, reboviruses, filoviruses. Emerging viruses

### Unit 8: Virology II

**Unit 8.1** Retroviruses

**Unit 8.2** Hepatitis viruses

**Unit 8.3** Other clinically important viruses

### Unit 9: Micology

**Unit 9.1** Introduction to fungi

**Unit 9.2** Cutaneous, subcutaneous and mucocutaneous mycoses

**Unit 9.3** Opportunistic Mycoses

**Unit 9.4** Systemic mycoses due to dimorphic fungi

### Unit 10: Parasitology

**Unit 10.1** Introduction to parasites

**Unit 10.2** Protozoa

**Unit 10.3** Helminths

**Unit 10.4** Arthropods

## 7. Activities, Units/Modules and Methodology

| Training Activity                 | Methodology | Related Competences<br>(only degrees before RD<br>822/2021) | ECTS | Hours | As | Com | Description                         |
|-----------------------------------|-------------|-------------------------------------------------------------|------|-------|----|-----|-------------------------------------|
| Class Attendance (practical) [ON- |             |                                                             |      |       |    |     | Laboratory practicals; theoretical- |

|                                               |                                  |  |                                      |     |   |   |                                                                       |
|-----------------------------------------------|----------------------------------|--|--------------------------------------|-----|---|---|-----------------------------------------------------------------------|
| [SITE]                                        | Practical or hands-on activities |  | 0.6                                  | 15  | Y | Y | practical seminars.                                                   |
| Class Attendance (theory) [ON-SITE]           | Lectures                         |  | 0.6                                  | 15  | Y | Y | Expository method; lecture                                            |
| Progress test [ON-SITE]                       | Assessment tests                 |  | 0.1                                  | 2.5 | Y | Y | Theory and practical assessment tests                                 |
| Final test [ON-SITE]                          | Assessment tests                 |  | 0.1                                  | 2.5 | Y | N | Theory and practical assessment tests                                 |
| Project or Topic Presentations [ON-SITE]      | Guided or supervised work        |  | 0.6                                  | 15  | Y | Y | Tutored work                                                          |
| Problem solving and/or case studies [ON-SITE] | Problem solving and exercises    |  | 0.4                                  | 10  | Y | Y | Exercise and problem solving                                          |
| Writing of reports or projects [OFF-SITE]     | Group Work                       |  | 0.24                                 | 6   | Y | N | Group work; Self-study                                                |
| Study and Exam Preparation [OFF-SITE]         | Self-study                       |  | 2.56                                 | 64  | Y | N | Self-study                                                            |
| Other off-site activity [OFF-SITE]            | Self-study                       |  | 0.8                                  | 20  | Y | N | Analysis, elaboration and study of the practical guides (autonomous). |
| Total:                                        |                                  |  | 6                                    | 150 |   |   |                                                                       |
| Total credits of in-class work: 2.4           |                                  |  | Total class time hours: 60           |     |   |   |                                                                       |
| Total credits of out of class work: 3.6       |                                  |  | Total hours of out of class work: 90 |     |   |   |                                                                       |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

| 8. Evaluation criteria and Grading System |                       |                            |                                                          |
|-------------------------------------------|-----------------------|----------------------------|----------------------------------------------------------|
| Evaluation System                         | Continuous assessment | Non-continuous evaluation* | Description                                              |
| Progress Tests                            | 30.00%                | 0.00%                      | Module exams (3% each module out of a total of 10)       |
| Final test                                | 40.00%                | 70.00%                     | Theoretical final exam (40% ordinary; 70% extraordinary) |
| Final test                                | 20.00%                | 20.00%                     | Practical final exam (20%)                               |
| Laboratory sessions                       | 5.00%                 | 5.00%                      | Oral presentations, problems, clinical cases, etc        |
| Assessment of active participation        | 5.00%                 | 5.00%                      | Participation and attitude                               |
| <b>Total:</b>                             | <b>100.00%</b>        | <b>100.00%</b>             |                                                          |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

Assessment criteria for the ordinary exam:

- Continuous assessment:

Students enrolled for the first time in a subject have two opportunities for assessment during the academic year:

1. Ordinary evaluation: this includes the continuous assessment of all the theoretical and practical activities reflected in the syllabus.
2. Extraordinary evaluation: this includes the assessment of only the failed part of the subject in the ordinary examination. It will consist of a theoretical and/or practical exam (the rest of the marks of the practical part will be those obtained during the course in reports, seminars, oral presentations, participation and attitude).

In the event of failing the subject, the options for the next academic year will be two of the following three options:

1. Ordinary evaluation: within this, two options are available:

a. Classroom-based mode: includes the continuous assessment of the theoretical and practical activities reflected in the syllabus, of the part that has not been passed in the previous year (theoretical or practical), complying with the conditions described in the teaching guide of the subject, opting for voluntary attendance.

b. Non-attendance mode: this includes the assessment of only the failed part of the subject in the previous year with one theory and/or practical exam per semester, on the same date as the final exam of each semester. Other practical results than the practical exam will be those retained from the previous year. This modality can only be chosen in the case of having taken the subject in the ordinary on-site examination in the previous academic year.

2. Extraordinary evaluation: this includes the assessment of only the failed part of the subject in the ordinary evaluation either from the current academic year, if the student has chosen the ordinary classroom-based mode, or from the previous academic year, in all other cases. It will consist of a theoretical and/or practical exam. In the case of not having taken the ordinary classroom-based mode examination in the current or previous academic year, the results of previous examinations will not be taken into account, as only one academic year will be kept.

3. Special evaluation: this includes the assessment of only the failed part of the subject in the previous year. This can only be requested in the case of "key subjects". It will consist of a theoretical and/or practical exam; the rest of the results of the practical part will be those of the previous year. In the case of not having taken the ordinary classroom-based mode evaluation in the current or previous academic year, the results of previous examinations will not be taken into account, as only one academic year will be kept. These conditions will only be maintained in the academic year consecutive to the ordinary on-site examination of a subject. The result for the practical or theoretical part passed will only be kept if the minimum attendance requirements for passing the subject described in the electronic guide have been met.

ORDINARY evaluation:

Theoretical evaluation:

70% distributed in: 30% module exams + 40% final exams

In order to pass the subject, it will be necessary to obtain 40% of this part, which means at least 2.8 points of the 10 total points of the subject and to fulfil the requirements of the section "Evaluation criteria". For the module exams, no minimum result is established, so all the results obtained will be added together. For the final exams a minimum result equal to 40% of the maximum result to be achieved in each final exam is established.

In order to favour the weight of the continuous assessment in the final grade, not reaching the minimum grade established will not mean the impossibility of passing the subject, but that the points of that final exam will not be added to the rest of the points obtained.

Evaluation of practices, presentations, problems, work, participation and attitude:

30%, assessed jointly as: practical exams at the end of the semester (20%) + oral presentations/seminars/clinical cases (5%) + participation and attitude (5%)

In order to pass the course, it will be necessary to obtain 40% of this practical part, which represents at least 1.2 points of the 10 total points of the subject and to fulfil the requirements of the section Evaluation criteria that appears in the electronic guide.

#### EXTRAORDINARY EXAMS, SPECIAL FINAL EXAMS, ORDINARY NON-ATTENDANCE EXAMS:

Theoretical evaluation: exam with a weight of 70%. In order to pass the subject, it will be necessary to obtain 40% of this theoretical part, which means at least 2.8 points in the theoretical part of the 10 total points of the subject and to fulfil the requirements of the section "Evaluation criteria". In the case of having passed the theoretical part in the current or previous year, the mark obtained in the last exam will be maintained.

Practical assessment: in order to pass the subject, it will be necessary to obtain 40% of the 30%, which means at least 1.2 points in the practical part of the 10 total points of the subject and to fulfil the requirements of the section "Assessment criteria". In the case of having passed the practical part in the current or previous year, the mark obtained in the last exam will be maintained.

A practice exam will be taken from the previous ordinary on-site examination, either from the current or the previous year.

#### Non-continuous evaluation:

See what is described in the previous section.

#### Specifications for the resit/retake exam:

See what is described in the previous section.

#### Specifications for the second resit / retake exam:

See what is described in the previous section.

| 9. Assignments, course calendar and important dates              |                             |
|------------------------------------------------------------------|-----------------------------|
| Not related to the syllabus/contents                             |                             |
| Hours                                                            | hours                       |
| <b>Unit 1 (de 10): Introduction to Microbiology</b>              |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 11-09-2023                                  | <b>End date:</b> 29-09-2023 |
| <b>Unit 2 (de 10): Microbiological diagnosis. Antimicrobials</b> |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 02-10-2023                                  | <b>End date:</b> 19-10-2023 |
| <b>Unit 3 (de 10): Bacteriology I</b>                            |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 23-10-2023                                  | <b>End date:</b> 10-11-2023 |
| <b>Unit 4 (de 10): Bacteriology II</b>                           |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 13-11-2023                                  | <b>End date:</b> 30-11-2023 |
| <b>Unit 5 (de 10): Bacteriology III</b>                          |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 01-12-2023                                  | <b>End date:</b> 22-12-2023 |
| <b>Unit 6 (de 10): Bacteriology IV</b>                           |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 29-01-2024                                  | <b>End date:</b> 16-02-2024 |
| <b>Unit 7 (de 10): Virology I</b>                                |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 19-02-2024                                  | <b>End date:</b> 08-03-2024 |
| <b>Unit 8 (de 10): Virology II</b>                               |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 11-03-2024                                  | <b>End date:</b> 05-03-2024 |
| <b>Unit 9 (de 10): Micology</b>                                  |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 08-04-2024                                  | <b>End date:</b> 26-04-2024 |
| <b>Unit 10 (de 10): Parasitology</b>                             |                             |
| Group 20:                                                        |                             |
| <b>Initial date:</b> 29-04-2024                                  | <b>End date:</b> 17-05-2024 |

| 10. Bibliography and Sources              |                                                                                                                                                                                                                                                    |                               |      |               |      |                     |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|---------------|------|---------------------|
| Author(s)                                 | Title/Link                                                                                                                                                                                                                                         | Publishing house              | Citv | ISBN          | Year | Description         |
| Martin-Béjar-Gutiérrez-Llagostera-Quesada | Microbiología esencial<br><a href="https://www.medicapanamericana.com/libro/microbiologia-esencial-incluye-version-digital">https://www.medicapanamericana.com/libro/microbiologia-esencial-incluye-version-digital</a>                            | Editorial Médica Panamericana |      | 9788498357868 | 2019 | 1ª Edición          |
| SEIMC                                     | Enfermedades Infecciosas y Microbiología Clínica<br><a href="http://www.elsevier.es/es-revista-enfermedades-infecciosas-microbiologia-clinica-28">http://www.elsevier.es/es-revista-enfermedades-infecciosas-microbiologia-clinica-28</a>          | Elsevier                      |      | 0213-005X     |      | Revista de la SEIMC |
| Tortora GJ, Funke BR & Case CL            | Introducción a la Microbiología (12ª edición)<br><a href="https://www.medicapanamericana.com/Libros/Libro/6024/Introduccion-a-la-Microbiologia.html">https://www.medicapanamericana.com/Libros/Libro/6024/Introduccion-a-la-Microbiologia.html</a> | Editorial Médica Panamericana |      | 9789500695404 | 2017 | 12 edición          |

|                                              |                                                                                                                                                                                                               |                                    |                |      |            |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------|------|------------|
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| Ash, L.R., Orihel, T.C                       | Atlas de Parasitología Humana                                                                                                                                                                                 | Editorial Médica Panamericana      | 9789500601283  | 2007 | 5ª Edición |
|                                              | <a href="https://www.medicapanamericana.com/Libros/Libro/5263/eBook-Atlas-de-Parasitologia-Humana.html">https://www.medicapanamericana.com/Libros/Libro/5263/eBook-Atlas-de-Parasitologia-Humana.html</a>     |                                    |                |      |            |
| Díaz, R., Gamazo, C., López-Goñi, I          | Manual práctico de microbiología                                                                                                                                                                              | Elsevier-Masson                    | 978844581519-9 | 2005 | 3ª Edición |
| Engleberg                                    | Schaechter. Mecanismos de las enfermedades microbianas                                                                                                                                                        | Lippincott                         | 978-8415684084 | 2014 | 1ª Edición |
| Gallego Berenguer, J                         | Manual de parasitología: Morfología y biología de los parásitos de interés sanitario.                                                                                                                         | Ediciones Universitat de Barcelona | 9788447531417  | 2007 | 3ª Edición |
| Cornelissen, Cynthia Nau                     | Microbiología                                                                                                                                                                                                 | Lippincott William and Wilkins     | 9788417602567  | 2019 | 4ª Edición |
|                                              | <a href="http://www.lww.co.uk/microbiology/microbiology-content">http://www.lww.co.uk/microbiology/microbiology-content</a>                                                                                   |                                    |                |      |            |
| Murray, P.R., Rosenthal, K.S., Pfaller, M.A. | Microbiología Médica                                                                                                                                                                                          | Elsevier                           | 9788481749274  | 2021 | 9ª Edición |
| Prats, G                                     | Microbiología y Parasitología Médicas                                                                                                                                                                         | Editorial Médica Panamericana      | 9788498354294  | 2013 | 1ª Edición |
|                                              | <a href="https://www.medicapanamericana.com/Libros/Libro/4404/Microbiologia-y-Parasitologia-Medicas.html">https://www.medicapanamericana.com/Libros/Libro/4404/Microbiologia-y-Parasitologia-Medicas.html</a> |                                    |                |      |            |
| Pumarola A                                   | Microbiología y Parasitología Médica                                                                                                                                                                          | Masson                             | 9788445800607  | 1992 |            |