

**Basic Translational and Clinical Research Skills****2014/2015**Code: 42896  
ECTS Credits: 9

| Degree                                               | Type | Year | Semester |
|------------------------------------------------------|------|------|----------|
| 4313794 Bioquímica, Biologia Molecular i Biomedicina | OT   | 0    | A        |

**Contact**Name: Josep Quer Sivila  
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Some groups entirely in English: No  
Some groups entirely in Catalan: Yes  
Some groups entirely in Spanish: No**Teachers**

Juan Genescà Ferrer  
 Xavier Vidal Guitart  
 Francisco Rodríguez Frías  
 Ramón Gimeno Martínez  
 César Galo García Fontecha  
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 Rosa Maria Prieto Sanchez  
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Ramon Antoni Martí Seves

## External teachers

Agustin Ruíz

Angel Sanchez

Ignacio Ferreira González

Manuel Galiñanes Hernández

Mar Borregan Prats

Miguel del Campo Casanelles

## Prerequisites

- Requirements to be admitted to the master's degree.
- English Level B2.

## Objectives and Contextualisation

The aim of the module is to enable students to acquire the basic knowledge on the ethical, methodological, regulatory and logistical aspects used in translational and clinical research, to be able to plan experiments in human pathology based on Genomics, Proteomics, Cytomics and Metabolomics, to acquire the knowledge to identify the transferability of the results of their research to the market, and to understand the bases and the application of new diagnostic tools (massive sequencing, magnetic resonance imaging, microarrays, nanotechnology, etc.) and advanced therapies in human pathology.

## Skills

- Analyse and explain normal morphology and physiological processes and their alterations at the molecular level using the scientific method.
- Apply techniques for modifying living beings or parts of these in order to improve pharmaceutical and biotechnological processes and products or develop new products.
- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Conceive, design, develop and synthesise scientific and/or biotechnological projects within biochemistry, molecular biology or biomedicine.
- Develop critical reasoning within the subject area and in relation to the scientific or business context.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
- Use and manage bibliography and IT resources related to biochemistry, molecular biology or biomedicine.
- Use scientific terminology to account for research results and present these orally and in writing.

## Learning outcomes

1. Apply knowledge of the molecular mechanisms underlying human diseases in order to make a diagnosis in problem cases.

2. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
3. Design and conduct a research project in the field of biochemistry, molecular biology or biomedicine.
4. Develop critical reasoning within the subject area and in relation to the scientific or business context.
5. Distinguish the processes by which pre-clinical research is conducted into new therapy agents.
6. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
7. Propose the use of pre-clinical animal models and cell models in advanced therapies.
8. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
9. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
10. Use and manage bibliography and IT resources related to biochemistry, molecular biology or biomedicine.
11. Use scientific terminology to account for research results and present these orally and in writing.

## Content

### SECTION I: Preclinical Research

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Lesson 1            Animal House Facility.

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Lesson 2            Biomedical Research with human biological samples. Biobanks

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Lesson 3            Examples of genetically modified animal models

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Lesson 4            Preclinical Evaluation of New Therapeutic Agents: Traditional Approaches in Combination with New Im Technologies  
  
Non-invasive Optical Imaging Applications in Preclinical Development of Novel Oncology Therapies

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### SECTION II: Tools for Diagnosis in Human Pathology

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Lesson 1            Omic technologies for personalized medicine (Unit of High Technology -UAT-)

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Lesson 2            Microarrays

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Lesson 3            Massive Sequencing in Viral Hepatitis.

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Lesson 4            Use of sequencing technologies to investigate the human microbiome

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Lesson 5            Nuclear Magnetic Resonance (NMR) as a diagnostic tool for research in liver encephalopathy

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Lesson 6            Implications of massive sequencing in Clinical Genetics

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Lesson 7            Cytogenetic Prenatal Diagnosis: past and present trends

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Lesson 8            The use of genetic tool in Dysmorphology

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Lesson 9            Genome wide analysis (GWAS) in dementia and other neurodegenerative disorders

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Lesson 10           Identification of BIOMARKERS using microarrays

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Lesson 11           Tools to study subcellular organel alterations

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Lesson 12           Proteomics, a general purpose tool for the biomedical research laboratory

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Lesson 13           Proteomic techniques for the identificacion and validation of biomarkers

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SECTION III: Advanced Therapies

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Lesson 1            Introduction to Advanced Therapies

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Lesson 2            Therapies with mesenchymal cells

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Lesson 3            Cell therapy for fetal repair

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Lesson 4            Regenerative Medicine. Miocardial repair

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Lesson 5            Immunotherapy

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Lesson 6            Hematopoietic transplantation

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Lesson 7            Gene therapy

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Lesson 8 General Introduction to Nanomedicine. Drug delivery systems

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Lesson 9 Inorganic Nanoparticles with applications in medicine

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SECTION IV: Clinical Research and Clinical Trials

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Lesson 1 Methodologies for Clinical Research. Incidence and prevalence, etiology, diagnostics, pronostics, treat and disease prevention. Priorities in Clinical Research.

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Lesson 2 Clinical Trial design. Methods for Clinical epidemiology, observational and experimental studies. Advant and disadvantages.

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Lesson 3 Operational aspects. How to manage with clinical trials. Most frequent problems.

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Lesson 4 Methodological problems and limitations. Valididty, bias and errors. The importance of clinical results.

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Lesson 5 Clinical Trials

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Lesson 6 Legal and ethical issues of clinical research.

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## Methodology

Theoretical classes. Discussion of problems in class. Visit laboratories. Stimulate the interest of the students to solve real or putative clinical problems. Reading articles to propose a team based research project. Discussion of projects.

## Activities

| Title               | Hours | ECTS | Learning outcomes                 |
|---------------------|-------|------|-----------------------------------|
| Type: Directed      |       |      |                                   |
| Talk clinical cases | 10    | 0.4  | 1, 4, 3, 5, 7, 6, 8, 2, 9, 10, 11 |
| Theory classes      | 42    | 1.68 | 1, 5, 7, 6, 9                     |
| Type: Supervised    |       |      |                                   |
| Monographs          | 55    | 2.2  | 4, 3, 5, 7, 6, 8, 2, 9, 10, 11    |
| Type: Autonomous    |       |      |                                   |
| Study               | 115   | 4.6  | 1, 4, 3, 5, 7, 6, 8, 2, 9, 10, 11 |

## Evaluation

Writing a project based on a putative or real clinical problem (team work). 30%

Defence of the project in front of all the students and evaluators. 35%

Answer online questions to look for the information. 15%

Attendance and active participation during theoretical classes. 20%

Regular attendance is obligatory for all the students. Maximum permitted absence: 20% of the classes.

## Evaluation activities

| Title                            | Weighting | Hours | ECTS | Learning outcomes                 |
|----------------------------------|-----------|-------|------|-----------------------------------|
| Answer online questions          | 15%       | 2     | 0.08 | 4, 3, 5, 7, 2, 9, 10, 11          |
| Assistance to lessons            | 20%       | 0     | 0    | 1, 4, 3, 5, 7, 6, 8, 2, 9, 10, 11 |
| Delivery of research project     | 30%       | 0     | 0    | 1, 4, 5, 7, 6, 8, 2, 9            |
| Oral presentation of the project | 35%       | 1     | 0.04 | 1, 4, 3, 5, 7, 6, 8, 2, 9, 11     |