

State of the Art and Research Methods

Code: 43429
ECTS Credits: 9

Degree	Type	Year	Semester
4314939 Advanced Nanoscience and Nanotechnology	OB	0	A

Contact

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Use of languages

Principal working language: english (eng)

Prerequisites

N/A

Objectives and Contextualisation

The main fields of research in nanoscience and nanotechnology (N+N) are covered in this module.

The basic concepts of scientific research, the scientific method, documentation, research ethics, work planning (case studies), etc. are introduced.

Skills

- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Continue the learning process, to a large extent autonomously
- Design, plan and carry out a research project in nanoscience and nanotechnology.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
- Seek out information in the scientific literature using appropriate channels, and use this information to formulate and contextualise a research topic.
- Show expertise in using scientific terminology and explaining research results in the context of scientific production, in order to understand and interact effectively with other professionals.
- 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.

Learning outcomes

1. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
2. Contextualise a research project with regard to the state of the art on the basis of an efficient review of the literature.
3. Continue the learning process, to a large extent autonomously
4. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.

5. Propose appropriate protocols and methodologies to conduct a research project related to nanoscience and nanotechnology.
6. Seek out information in the scientific literature using appropriate channels, and use this information to formulate and contextualise a research topic.
7. Show expertise in using scientific terminology and explaining research results in the context of scientific production, in order to understand and interact effectively with other professionals.
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.

Content

During the academic year, a number of seminars on current topics of research in N+N will be given. The students have to attend and report on at least four seminars.

Further, the students will be provided with the required skills and tools to plan, manage and track their own research projects. Through this module the students should be able to:

- (i) Contextualize the state-of-the-art of a topic/research work from the gathered bibliographic information and the specialized databases, and critically analyse the reliability of the information sources.
- (ii) Plan and manage research projects, by paying special emphasis to the distinctive features of the research projects within the area of nanoscience and nanotechnology. To this end, students will be asked to apply such a knowledge to practical case studies.

Methodology

The State-of-the-Art and Research Methodologies (9 ECTS) will serve as a seed to build the Final Master Thesis (15 ECTS). For that reason, the students are required to deliver a brief report of about 15 pages which should reflect:

- (i) The state-of-the-art of the topic/research work the student will develop during the Final Master Thesis;
- (ii) The planning and management of the Final Master Thesis: the project goals and the planning and timing of the research tasks should be clearly outlined.

Tentative report outline:

The report should be organized as follows:

- (i) Table of contents
- (i) Presentation of the topic of investigation/research, clearly establishing the objectives
- (ii) State-of-the-art of the topic
- (iii) Project planning
- (iv) Methodologies
- (v) Timing of tasks (Gantt diagram)
- (vi) Bibliographic material (patents, specialized journals, interviews, etc.)

The report must be written in English. The maximum length of the report is 15 pages. Two copies should be delivered to the Evaluation Committee and a digital copy (in pdf format) should be sent by email to the Master's Coordinator. The report will be later added as Annex to the Final Master Thesis report.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Tutorial support sessions	5	0.2	3, 5, 8, 9
Type: Supervised			
Seminars	30	1.2	7, 8
Type: Autonomous			
Reading of articles/reports	55	2.2	1, 2, 4, 7, 8

Evaluation

The State-of-the-Art and Research Methodologies' Coordinator will evaluate the reports presented by the students.

The evaluation will consider the quality of the report and the attendance to seminars and other supervised activities.

The opinion of the Final Master Thesis Director could be taken into account for the final mark.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Attendance to conferences and complementary activities	20%	30	1.2	1, 4, 7, 8
Delivery of reports	80%	105	4.2	2, 3, 5, 6, 9

Bibliography

N/A