

# Characterization, Fabrication, and Manipulation at Nanometer Scale

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[https://www.phys.sinica.edu.tw/TIGP-  
NANO/Course/2020\\_Spring/2020\\_Spring\\_Characterization.html](https://www.phys.sinica.edu.tw/TIGP-NANO/Course/2020_Spring/2020_Spring_Characterization.html)

## **Course Objectives**

This course intends to familiarize students with some standard methods and techniques employed in current research related to nanoscale characterization, fabrication and manipulation. The emphasis, besides given lectures, has also been placed on the student's ability to apply the acquired knowledge to studying a recent relevant article and to present it to the audience at an understandable level.

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## Syllabus (2020)

Week 01 (3/05)	Introduction and EM: structure and working principles (Prof. Tung Hsu, NTHU)
Week 02 (3/12)	STM: structure and working principles
Week 03 (3/19)	SPM: structure and working principles
Week 04 (3/26)	OM: structure and working principles (Dr. Kung-Hsuan Lin)
Week 05 (4/02)	National Holiday
Week 06 (4/09)	Growth of nanomaterials and thin films (Dr. Raman Sankar)
Week 07 (4/16)	Spectroscopy: optical and electronic
Week 08 (4/23)	Midterm Written Exam (35%)
Week 09 (4/30)	Atomic manipulations and optical tweezers
Week 10 (5/07)	Lithography: optical, e-beam (Prof. C.D. Chen, AS)
Week 11 (5/14)	Quantum transport in nanostructures
Week 12 (5/21)	Overview of emergent materials and microscopic techniques
Week 13 (5/28)	Paper study and presentations
Week 14 (6/04)	Paper study and presentations
Week 15 (6/11)	Paper study and presentations
Week 16 (6/18)	Final Written Exam (25%)
Week 17 (6/25)	Deadline for final report (40%)

## Paper study

- ✧ A number of relevant papers are selected from publishing journals.
- ✧ Each student should choose 3 papers with preference order and send it to the instructor ([jasonc@phys.sinica.edu.tw](mailto:jasonc@phys.sinica.edu.tw)) within two weeks.
- ✧ Upon the reception of a student's choice, the instructor will assign the paper to the student based on her/his preference. However, in case the paper has been chosen, the student will be assigned with the paper on the following order.
- ✧ The student should study the assigned paper and prepare a power-point file for presentation toward the end of this course.

## **Grading of this course**

- ❖ Midterm Written Exam (35%)
- ❖ Final Written Exam (25%)
- ❖ Presentation and report
  - Presentation (30 minutes, 30%)
  - Report (at most two pages, 10%)

# Paper presentation and report

- Presentation (30 minutes)

Students should prepare power-point slides from the paper assigned in the beginning of this course, and present them in a way that is understandable to their classmates. The suggested format is 25 min for presentation and 5 min for answering questions from the audience.

- Report (at most two pages)

Students should write a report on:

- 1) The paper assigned in the beginning of this course, including a) synopsis of the paper and b) what can be further studied from this paper.
- 2) Afterthoughts about her/his presentation and suggestions for improving the future course.