### Course Code
PHYS8701 (RPG)

### Title
Physics experimental techniques

### Offering Department
Physics

### Course Co-ordinator
Prof M H Xie  
Physics

### Course Co-ordinator Email
mhxie@hku.hk

### Teachers Involved

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Prof M H Xie</td>
<td>Physics</td>
<td>17.5</td>
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<tr>
<td>Prof X D Cui</td>
<td>Physics</td>
<td>15</td>
</tr>
<tr>
<td>Prof S Zhang</td>
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</tr>
<tr>
<td>Dr F C C Ling</td>
<td>Physics</td>
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<tr>
<td>Dr D K Ki</td>
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<td>Dr T T Luu</td>
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<td>Dr J H C Lee</td>
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<tr>
<td>Dr Y J Tu</td>
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<tr>
<td>Dr Y F Chan</td>
<td>Electron Microscope Unit</td>
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<tr>
<td>Dr C Liu</td>
<td>Physics, SUSTech</td>
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### Course Objectives
This course provides a detailed account of some common experimental techniques in physics research. It introduces the basic working principles, the operational knowhow, and the strength and limitations of the techniques.

### Course Contents & Topics
This course will discuss and train students of the following techniques:
1. Noise and Data Analysis
2. Computer Grid
3. Raman spectroscopy and photoluminescence (PL)
4. Temporal characterization of ultrashort laser pulses
5. Chirped Pulse Amplification - Technique to amplify laser pulses
6. Cryogenics and low-noise electrical measurements
7. Nanofabrication techniques
8. Scanning Probe Microscopy (STM and AFM)
10. Photoemission Spectroscopy (PES)
11. Transmission Electron Microscopy (TEM)
12. Radiation Detection and Measurements in Nuclear Physics

### Course Learning Outcomes (CLO)
On successful completion of this course, students should be able to:
- CLO 1 describe and explain the working principles of the various techniques
- CLO 2 identify the strength and limitation of each technique, therefore, choose the right technique for characterization of properties
- CLO 3 know the operational details and interpret the data obtained by the techniques

### Pre-requisites (and Co-requisites and Impermissible combinations)
Nil

### Offer in 2022 - 2023
Y  
2nd sem  
Examination  
No Exam

### Course Grade
Pass or Fail
Grade Descriptors

Pass: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.

Fail: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type
Lecture with laboratory component elective course

Course Teaching & Learning Activities

<table>
<thead>
<tr>
<th>Activities</th>
<th>Details</th>
<th>No. of Hours</th>
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<tbody>
<tr>
<td>Lectures</td>
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<tr>
<td>Demonstrations of some selective techniques</td>
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<td>8</td>
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<tr>
<td>Reading/Self study</td>
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Assessment Methods and Weighting

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<th>Details</th>
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<tr>
<td>Attendance</td>
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<tr>
<td>Presentation</td>
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<tr>
<td>In class quizzes</td>
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Quota
9999 (9999 if no quota)

Required/recommended reading and online materials
Nil