

The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	AP619
Subject Title	Microfabrication Laboratory
Credit Value	3
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To make the students familiar with the microfabrication concepts, materials and methods that are typically used in a cleanroom.
Intended Learning Outcomes <i>(Note 1)</i>	Upon completion of the subject, students will be able to: a) understand the basic knowledge of a cleanroom, the working procedures, and the safety aspects; b) understand the principles behind the design and fabrication of semiconductor devices and the effect of processes on their performance; c) have a thorough understanding of the available fabrication technologies; and d) experimentally carry out a simple process recipe using the most common microfabrication techniques.
Subject Synopsis/ Indicative Syllabus <i>(Note 2)</i>	<ul style="list-style-type: none">• Physical principles of IC fabrication processes;• Surface preparation;• Thermal processes;• Chemical and physical vapor depositions;• Resist coating and removal;• Mask fabrication and advanced lithography;• Etching techniques;• Process characterization;
Teaching/Learning Methodology <i>(Note 3)</i>	In order to stimulate and motivate the students' interest in the study of cleanroom microfabrication technologies, several cleanroom microfabrication experiments will be offered to the students for them to gain hands-on experience on the growth of SiO ₂ thin film by thermal oxidation, CVD, PVD, lithography, patterning and etching. These proposed practical examples will demonstrate the importance of microfabrication in the forefront of modern microelectronics.

Assessment Methods in Alignment with Intended Learning Outcomes <i>(Note 4)</i>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>1. Written test</td> <td>50</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2. Continuous assessment</td> <td>50</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="4"></td> </tr> </tbody> </table>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				a	b	c	d	1. Written test	50	✓	✓	✓	✓	2. Continuous assessment	50	✓	✓	✓		Total	100 %				
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<p>Students should a) have gained the basic knowledge of a cleanroom, the working procedures, and the safety aspects; b) have gained knowledge in the principles behind the design and fabrication of semiconductor devices and the effect of processes on their performance; c) have a thorough understanding of the available fabrication technologies; and d) be able to experimentally carry out a simple process recipe using the most common microfabrication techniques.</p> <p>The continuous assessment includes the laboratory assignments, reports and presentation. Assignments will strengthen the students' basic knowledge and the analytical skill to solve the problems related to cleanroom microfabrication technologies as well as the cleanroom experimental skills on microfabrication. Tests will review their understanding of the course and examination will accelerate their knowledge understanding and improve their problem solving skills. Hence, the proposed assessment methods are necessary to assess the intended learning outcomes (i.e., items a, b, c, & d).</p>																													
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Reading List and References	<ul style="list-style-type: none"> • S. Franssila, Introduction to Microfabrication, John Wiley & Sons, 2010. • J. D. Plummer, M. D. Deal, and P. B. Griffin, Silicon VLSI Technology, Prentice Hall, 2000. • S.Wolf & R.N.Tauber, Silicon Processing for the VLSI Era, vol.1, 2nd edition, Lattice, 2000. • M. Madou, Fundamentals of Microfabrication, CRC Press, 1997. 																												