

Tamkang University Academic Year 109, 2nd Semester Course Syllabus

Course Title	INTRODUCTION OF ELECTRON MICROSCOPY	Instructor	CHIANG, CHENG-TIEN
Course Class	TSAXB4A BACHELOR'S PROGRAM IN ADVANCED MATERIALS SCIENCE, 4A	Details	<ul style="list-style-type: none"> ◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	SDG4 Quality education		
Departmental Aim of Education			
<ul style="list-style-type: none"> I. Enrich the fundamental knowledge of advanced material sciences. II. Emphasize the ability of self-expression. III. Strengthen the ability to experiment and team spirit. IV. Develop an international perspective and international exchanges. 			
Subject Departmental core competences			
<ul style="list-style-type: none"> A. Possess a fundamental knowledge of mathematics, physics, chemistry and biology. (ratio:50.00) B. Cultivate professional knowledge, experimental skills and the applications of nano, optoelectronic, biomedical and macromolecular materials.(ratio:50.00) 			
Subject Schoolwide essential virtues			
<ul style="list-style-type: none"> 5. Independent thinking. (ratio:50.00) 7. A spirit of teamwork and dedication. (ratio:50.00) 			
Course Introduction	Introduction of electron microscopies and their applications, including the basics of optics and electron optics.		

The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.

II. Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.

III. Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	Improve the knowledge of electron microscopies and their applications.	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	AB	57	Lecture, Discussion, Experience	Testing, Study Assignments, Discussion(including classroom and online), Report(including oral and written)

Course Schedule

Week	Date	Course Contents	Note
1	110/02/22 ~ 110/02/28	Introduction to geometric optics	
2	110/03/01 ~ 110/03/07	Laboratory visit and experiments	
3	110/03/08 ~ 110/03/14	Introduction to wave optics	
4	110/03/15 ~ 110/03/21	Introduction to optical elements	
5	110/03/22 ~ 110/03/28	Laboratory visit and experiments, introduction to optical microscope	
6	110/03/29 ~ 110/04/04	Introduction to quantum mechanics	
7	110/04/05 ~ 110/04/11	Overview of electron microscopes	
8	110/04/12 ~ 110/04/18	Introduction to electrostatics	
9	110/04/19 ~ 110/04/25	Laboratory visit and experiments, introduction to charged-particle optics	
10	110/04/26 ~ 110/05/02	Midterm Exam Week	

11	110/05/03 ~ 110/05/09	Introduction to scanning electron microscopy	
12	110/05/10 ~ 110/05/16	Introduction to transmission electron microscopy	
13	110/05/17 ~ 110/05/23	Laboratory visit and experiments, introduction to scanning tunneling microscopy	
14	110/05/24 ~ 110/05/30	Introduction to photoemission and low-energy electron microscopy	
15	110/05/31 ~ 110/06/06	Graduate Exam Week	
16	110/06/07 ~ 110/06/13	---	
17	110/06/14 ~ 110/06/20	---	
18	110/06/21 ~ 110/06/27	---	
Requirement			
Teaching Facility	Computer, Other (beamer and screen)		
Textbooks and Teaching Materials			
References	<p>Introduction to optics, G. Chartier, ISBN: 978-0-387-27598-7, https://doi.org/10.1007/b106780 Physical principles of electron microscopy - an introduction to TEM, SEM, and AEM, R.F. Egerton, ISBN: 978-3-319-39877-8, https://doi.org/10.1007/978-3-319-39877-8 Transmission electron microscopy - a textbook for materials science, part I. basics, D. B. Williams and C. B. Carter, ISBN: 978-0-387-76501-3, https://doi.org/10.1007/978-0-387-76501-3 Scanning probe microscopy - atomic force microscopy and scanning tunneling microscopy, B. Voigtländer, ISBN: 978-3-662-45240-0, https://doi.org/10.1007/978-3-662-45240-0 Surface microscopy with low energy electrons, E. Bauer, ISBN: 978-1-4939-0935-3, https://doi.org/10.1007/978-1-4939-0935-3</p>		
Number of Assignment(s)	1 (Filled in by assignment instructor only)		
Grading Policy	<p>◆ Attendance : 40.0 % ◆ Mark of Usual : 20.0 % ◆ Midterm Exam : % ◆ Final Exam : % ◆ Other <midterm report> : 40.0 %</p>		
Note	<p>This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php .</p> <p>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</p>		