Course Staff

Course Convener:	A/Prof. Ashraf Uddin, TETB Room 126; a.uddin@unsw.edu.au
Lecturers:	A/Prof. Ashraf Uddin,
Tutors:	Mo Alvin and Londono Daniel

Consultations: For all enquiries about the course please contact the course convener. A regular weekly consultation time is on Wednesday **2 - 4 pm at online (MS Team) or at TETB room 126**. For all other questions or enquiries, you are encouraged to ask the lecturer after class or post your questions on the Discussion Board on Moodle.
https://moodle.telt.unsw.edu.au/login/index.php

Keeping Informed: All course materials and announcements will be posted on Moodle. Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

Course Details

Credits

This is a 6 UoC course and the expected workload is 12–14 hours per week throughout the 10-week semester.

Relationship to Other Courses

SOLA9101 is the level 5 course. It is offered for 3rd and 4th year of UG students and Graduate Diploma and master's Postgraduate programs students in the School of Photovoltaic and Renewable Energy Engineering School. It is a professional elective course for th

(3) The performance evaluation and analysis of different advanced solar cells.
(4)

Diffusion doping and Thermal oxidation

Diffusion equations and profiles; two step diffusion: pre-deposition and drive-in diffusion. Oxidation enhanced diffusion. Thermal oxidation kinetics: Deal Grove equation, linear and parabolic rate coefficients, effects of dopants; Oxide charges; Oxidation equipment: furnace and rapid thermal processor.

Physical Vapor Deposition

Evaporative deposition technique. Principle of sputtering process. Plasma physics of sputtering. Processing considerations: bias, temperature and substrate heating. Structure and properties of sputter deposited films. Sputtering techniques: RF sputtering, DC magnetrons, bias sputtering, reactive sputtering and ion metal plasma sputtering.

Chemical Vapor Deposition

Basic aspects of CVD: gas phase mass transfer/surface reaction, rate determining step, sticking coefficient, step coverage of thin films and advantages/disadvantages. Types of reactions in CVD: APCVD, LPCVD and PECVD.

Spin-coating and ink-jet printing

Deposition of solution materials, Ink-Jet Printing, Microcontact Printing, nanoimprint technology**,** Self-Aligned Printing,

Photolithography

Basic photoresist technology. Photoresist material parameters: resolution, sensitivity and viscosity. Optical photoresist material types: positive/negative, multilayer and contrast enhancement resists. Photoresist processing: vapor prime, soft bake, alignment, exposure and development. Optics of microlithography. Methods of transferring patterns, pattern registration. Mask and reticle fabrication.

Etching

Wet etching technology, etchants. Lift-off technology for patterning. Basic physics and chemistry of plasma etching and reactive etching: bias, tolerance, anisotropy, selectivity, edge profile and etch rate; dry etching of various thin films.

Contact Hours

Lectures	**Day**	**Time**	**Location**
Lecture	Wednesday	10:00 – 11:00	Online (MS Team)
Lecture	Thursday	12:00 – 14:00	Online (MS Team)
Tutorial	Wednesday	12:00 – 14:00	Online (MS Team) tentative

electronics. The course covers the basics of the semi

5	Mid-session exam (L5A) Silicon crystal growth (L5B) Diffusion and doping of Si (L5C)	Tutorial 4 (Assignment 1 due)
6	Oxidation (L6A) Thermal evaporation (L6B) Sputtering (L6C)	Tutorial 5 (Assignment 2 out)
7	Basic CVD (L7A) Basic CVD (L7B) Spin-coating and ink-jet printing (L7C)	Tutorial 6

/Spa

On-line Resources

Website: UNSW's Moodle. As a part of the teaching component, Moodle will be used to disseminate teaching materials, host forums and occasionally quizzes. Assessment marks will also be made available via Moodle: https://moodle.telt.unsw.edu.au/login/index.php

Lecture Notes: Lecture notes will be provided before each lecture via UNSW's Moodle site.

Tutorials: Tutorial problems will be provided before each tutorial via moodle. The solutions will be provided after each tutorial class in UNSW moodle site.

Assignments (and other course materials): will be provided via UNSW's Moodle site.

PC1D solar cell simulator: Is installed on the PCs in TETB. For a personal copy, see www.pv.unsw.edu.au/links/products/pc1d.asp.

Announcements and Discussion Board: Announcements concerning course information will b

Claiming credit for a proportion a work contributed to a group assessment item that is greater than that contributed. [2]

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism. The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism. Students are reminded of their rights and responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at:

Regular and punctual attendance at all classes is expected. UNSW regulations state that if students attend less than 80% of scheduled classes, they may be refused final assessment.

General Conduct and Behaviour

Consideration and respect for the needs of your fellow students and teaching staff is an expectation. Conduct which unduly disrupts or interferes with a class is not acceptable and students may be asked to leave the class. Students are expected to not distract their colleagues during lectures and tutorials.

Work Health and Safety

UNSW policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others.

Special Consideration and Supplementary Examinations

You must submit all assignments and attend all examinations scheduled for your course. You should seek assistance early if you suffer illness or misadventure which affects your course progress. All applications for special consideration must be **lodged online through myUNSW within 3 working days of the assessment**, not to course or school staff. For more detail, consult https://student.unsw.edu.au/special-consideration.

Continual Course Improvement

At the end of the course, students will be asked to complete two evaluation forms – one for the course and one for the course coordinator using the UNSW's Course and Academic Teaching Evaluation and Improvement (CATEI) Process. Your feedback is much appreciated and taken very seriously. Continual improvements are made to the course based in part on such feedback and this helps us to improve the course for future students.

This course is under constant revision to improve the learning outcomes for all students. Please forward any feedback (positive or negative) on the course to the course convener or via the Course and Teaching Evaluation and Improvement Process. You can also provide feedback to RESOC who will raise your concerns at student focus group meetings. As a result of previous feedback obtained for this course and in our efforts to provide a rich and meaningful learning experience, we have continued to evaluate and modify our delivery and assessment methods.

Administrative Matters

On issues and procedures regarding such matters as special needs, equity and diversity, occupational health and safety, enrolment, rights, and general expectations of students, please refer to the School and UNSW policies:
http://www.engineering.unsw.edu.au/electrical-engineering/policies-and-procedures
https://my.unsw.edu.au/student/atoz/ABC.html

Appendix A: UNSW Graduate Capabilities

The course delivery methods and course content directly or indirectly address a number of core UNSW graduate capabilities, as follows:

> Developing scholars who have a deep understanding of their discipline, through lectures and solution of analytical problems in tutorials and assessed by assignments and written examinations.

Developing rigorous analysis, critique, and reflection, and ability to apply knowledge and skills to solving problems. These will be achieved by the tutorial problem solving as well as assignments.

Developing ethical practitioners who are collaborative and effective team workers, through group activities, seminars, and tutorials.

Developing independent, self-directed professionals who are enterprising, innovative, creative, and responsive to change, through challenging design