**Global Learning Initiatives Program Course Syllabus**

Please complete the following form in English. The information will be updated to the Global Learning Initiatives Program website for students’ reference. If you will be offering more than one course, please fill out one form per course offered. Examples in grey.

**Course Information**

|  |  |
| --- | --- |
| Course Name  \*provide the **English** course name of the course. | Introduction to Photovoltaics |
| Lecturer(s)  \*provide the lecturers’ **English** name. If there are more than one lecturer, please indicate all lecturers in the column. | 1. Niall Tumilty |
| Course Description  \*briefly describe the contents covered in the courses. | The need for clean and increasingly efficient energy conversion devices has never been more acute. In fact, the energy crisis is now recognized as the most pressing issue facing humanity.  Significant technological development and industry-wide cost reductions have brought photovoltaic technology into the main stream with further essential improvements and innovations likely in the years ahead. The course will introduce students to basics of PV technology through to recent state-of-the developments in both academia and industry. |
| Course Objectives  \*list out knowledge or skills students should acquire upon completion of course. | The course teaching objectives are as follows：  (1) Introduce students to basic semiconductor physics and photovoltaic technology  (2) Introduce wafer-based Si solar cells, device models and their manufacturing methods, Appreciate the advantages and limitations of Si based solar cells  (3) Introduce Organic and a-Si thin film PV technologies, Innovation in Solar energy, next generation concepts  (4) Introduce techniques used in characterizing solar cells, PV systems and reliability |
| Suggested Proficiencies  (if any)  \*list preferred knowledge or skills students should have before taking the course. | Semiconductors physics, materials science, physics |
| Reading List  (if any)  \*list out the textbooks, references, or other reading materials. | Handbook of Photovoltaic Science and Engineering, Antonio Luque, Steven Hegedus, 25 April 2003, John Wiley & Sons, Ltd  Wenham, S., M. Green, et al., eds. Applied Photovoltaics. 2nd ed. Routledge, 2006. ISBN: 9781844074013 |
| Grading Criteria  \*how would the students be assessed during the course. | 40% Mid-term assignment  40% Final report  20% Attendance |

**Course Schedule**

Please complete the following table with the dates and expected course topics. If there are more than one lecturers instructing the course, please also indicate the lecturer for each class.

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| --- | --- | --- | --- |
| Class | Date (YYYY/MM/DD) | Course Topic | Lecturer |
| 1 | Week 1 | Introduction, Energy bands in solids, E-K Band diagram | NT |
| 2 | Week 2 | Density of states in semiconductors | NT |
| 3 | Week 3 | The Solar Resource, Absorption and Losses in semiconductors | NT |
| 4 | Week 4 | Charge Excitation, Charge Separation, Part I | NT |
| 5 | Week 5 | Charge Separation, Part II, Device Model, Part I: Device Fundamentals | NT |
| 6 | Week 6 | In-class problems | NT |
| 7 | Week 7 | TBD | NT |
| 8 | Week 8 | Device Model, Part II: Material Fundamentals, Schottky Junction and Ohmic Contacts | NT |
| 9 | Week 9 | Mid-term assignment | NT |
| 10 | Week 10 | Silicon wafer-based Solar Cells | NT |
| 11 | Week 11 | Thin Films: Materials Choices and Manufacturing | NT |
| 12 | Week 12 | PV Efficiency: Measurement and Theoretical Limits, Next Generation concepts | NT |
| 13 | Week 13 | Organic Solar Cells, Amorphous Silicon Solar Cells | NT |
| 14 | Week 14 | Solar Cell Characterization, PV Systems, Modules and Reliability | NT |
| 15 | Week 15 | Revision week | NT |
| 16 | Week 16 | Final report hand-in | NT |