# *Special Topics Materials: Devices for Energy Storage, Harvesting and Conversion*

16:635:604:02:78052 (Rutgers)
MSE 528 (Princeton)

**Course instructors:** Deirdre O'Carroll (Rutgers) and Craig Arnold (Princeton)
**Time:** Tuesdays 9:00am to 12:00pm, Spring 2012
**Classroom:** Doolittle A102 (Rutgers) and Wallace 001 (Princeton). Classrooms will be linked via videoconference.

**Course description:**
This graduate level course will provide an integrated foundation of the devices used for energy storage and energy harvesting from the point of view of engineering and systems design. Devices in commercial production will be covered as well as 2nd and 3rd generation designs. Lectures will focus on the fundamentals of energy storage/harvesting devices including batteries, fuel cells, power electronics, photovoltaics, thermoelectrics and LEDs, given by experts in the field from both universities.

Grading will be based on a combination of homework and a final assignment.

**Class schedule:**

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| Week 1 – 2/7 | Overview of technologies and intro to course | Arnold and O'Carroll |
| | Electrochemical Storage Lectures | |
| Week 2 – 2/14 | Battery materials, types and uses | Amatucci |
| Week 3 – 2/21 | Foundation electrochemistry | Arnold |
| Week 4 – 2/28 | Fuel cell types, PEMs, etc. | Benziger, Klein |
| Week 5 – 3/6 | Photoelectrochemistry and fuel catalysis | Bocarsly |
| 3/13 | RU spring break | |
| 3/20 | PU spring break | |
| | Energy harvesting and conversion lectures | |
| Week 6 – 3/27 | Foundation: diodes and thermoelectric | Feldman |
| Week 7 – 4/3 | Visit to Princeton cogeneneration plant | Arnold, Borer |
| Week 8 – 4/10 | Light management: concentrators, plasmonics | O'Carroll |
| Week 9 – 4/17 | Inorganic PV materials/devices | Wagner |
| Week 10 – 4/24 | Organic PV materials/devices | O'Carroll, Loo |
| Week 11 – 5/1 | Visit to a local solar manufacturing plant | |

**Homework and Assignments**

- HOMEWORK: Readings will be assigned 1 week in advance of lecture. Each student will provide 2-3 questions for the lecturer the following Monday via Sakai. 3 or 4 of the questions will be assigned as homework, due the following Monday.
- FINAL ASSIGNMENT: A final written assignment will be given. Paper topics will be selected over Spring Break and abstracts will be approved by the instructors.

**Course Information**

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