

**University of Connecticut Department of Mechanical Engineering**  
**GRADUATE INDEPENDENT STUDY APPROVAL REQUEST**

**Instruction:**

1. This form applies to Mechanical Engineering graduate student who intends to take independent study course with a Mechanical Engineering faculty.
2. The Mechanical Engineering Department has the following regulation regarding taking independent study course:
  - For M.S. program, at most two independent study courses may be applied toward course work requirements. For students under Plan A, only one independent study course can be taken with the student's major advisor as instructor.
  - For Ph.D. program, at most two independent study courses can be applied towards course work requirements and only one independent study course can be taken with the student's major advisor as instructor.

*Please check the degree program status and course record before filing this request.*
3. A graduate student requesting an independent study will need to apply with the required forms to obtain approval prior to the commencement of the independent study which is no later than the last day of adding/dropping courses without additional signatures.

*Fill out this form – use attachment if necessary.*

Student's Name: ..... Peoplesoft Number:.....

Title of the independent study course:..Prognosis and Diagnostics of Li-Ion Batteries.....

Number of credits requested:.....<sup>3</sup>.....

Instructor's name: .....

Advisor's name: .....

**List of prior record of independent study courses taken** (For each independent study course taken in the past, please provide course title, instructor's name, time, and the degree program status at the time of taking the course)

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**Description of the independent study course intended** (Please include the list of topics to be covered and any books and/or references to be used)

**Learning Objectives**  
Operating principles and design/fabrication of Li-Ion batteries, electrochemical kinetics and transport phenomena in rechargeable batteries, electrochemical impedance spectra measurement, simulation and curve-fitting of electrochemical impedance spectra

**Relation to ME curriculum**  
While courses like Sustainable Energy cover rechargeable batteries, they do not go into details of prognosis and experimental diagnostics. This independent study provides an opportunity to gain deeper learning in these areas.

**Topics**  
This independent study will focus on prognosis of li-ion batteries. Experimental methods such as impedance spectroscopy measurement, x-ray computed tomography and thermal imaging will be used to evaluate batteries and predict life of Li-Ion batteries.

**Resources**  
A thorough literature review will be conducted. In addition, "Electrochemical Methods" by Bard and Faulkner will serve as a reference for experimental diagnostics.

**Assessment** (Describe how the final grade will be determined)

**Deliverables:**  
An end of semester report is the major deliverable in addition to the short weekly reports.

**Grading Rubric:**  
End of semester grade will depend on the final report as well as the progress as measured through weekly reports. Accuracy of the data presented in the report as well completeness of the methods development will affect the grade.

Student Signature:..... Date:...../...../.....

Instructor Signature:..... Date:...../...../.....

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Approval by Mechanical Engineering Director of Graduate Studies:  
Approve / Disapprove

Signature:..... Date:...../...../.....