

Coherence and Synergy in the Upper Level Physics Curriculum
Curriculum Development Grant Closing Report
Rolf Schimmrigk

1. *Description of grant-supported activity.*

I spent much of the Fall term of 2007 developing the modules that I proposed for the project. I have completed the writing of 4 of the six modules

- [1] Covariant methods of relativistic mechanics
- [2] Variational methods
- [3] Nonrelativistic Lagrange and Hamiltonian methods in electrodynamics
- [4] Minimal coupling

and I have almost finished the final two of the modules

- [5] Hamiltonian methods in quantum mechanics
- [6] Lagrangian methods in quantum mechanics.

2. *Were you able to complete the project? Describe any difficulty you had.*

The project was much more involved than I anticipated. Mostly, the difficulty is to connect the various topics to be discussed in the modules to the knowledge that students bring to the class. Initially, I outlined simply the ideas that were the main content of each of the modules, but then realized that this was not sufficient. The next iteration then provided the necessary background so that the students are able to absorb the key ideas. This process of having to proceed through a number of iterations made the writing of these modules very time consuming and I was not able to finish all of them during the Fall of 2007. I have been continuing to work on them during the current Spring term though, and I'm almost finished. What has helped in particular is that I'm currently teaching quantum field theory and the final two modules [5] and [6] are evolving as I develop the course (which is a new course at IUSB, and very likely is the first undergraduate quantum field theory ever taught at a University in the U.S.)

3. *Did, or will, the project result in a specific product - a manuscript, etc? If so, describe and indicate the state of development.*

These modules provide a set of manuscripts to be used in the various classes, such as P221, P222, P321, P331 and P453. They are also useful for P473 and quantum field theory.