Physics-Based Simulation Course

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GOALS & FORMAT

A. Learn to create a simulation study a biology problem.

B. Use SimTK programming system to solve a biological problem with physical simulation.

C. Use programming black boxes intelligently.

D. Learn to evaluate the results of a simulation

E. Become exposed to current and past DBP's.

F. Identify key .

G. Identifying the technology is applicable to your problems.

TYPE OF COURSE

A. First year graduate students, Need introductions.

B. Advanced for people trying to solve a problem.

C. On-Campus.

D. Later make it on-line.

E. Mix lectures and labs

TARGET STUDENTS

A. First year graduate students.

B. Prerequisites:
   1. C Programming.
   2. Math through calculus.
   3. Physical intuitions. F=ma.
   4. Biology.
   5. Using programs.

C. Have courselets to fill gaps.

TOPICS TO COVER (1)

Weeks 1 & 2. Introduce major problems that can be addressed by simulation. Motivation & Language.

1. What is biological simulation?
2. What is SimTK?
3. Simulation techniques
4. Using black boxes

Weeks 3 & 4. RNA Simulation at the Atomic Scale.

Weeks 5 & 6. Myosin simulation at the Meso Scale.

Weeks 7 & 8. Cardiovascular simulation at the Mini Scale.

Weeks 9 & 10. Skeletal simulation at the Room Scale.

TOPICS TO COVER (2)

How to select the question to ask?

How to get started?

Use SimTK to solve a relevant problem.

FINAL PROJECT

A. Use SimTK to solve a simple biological problem.

OTHER IDEAS

1. Teach biologists the value of simulation
2. Teach simulationists the value of biology
3. Teach the value of controls
4. See the data acquisition
5. Have group projects
6. Keep this as a feeder to more specialists course.