226710 COMPUTATIONAL ASTROPHYSICS

(ฟิสิกส์ดาราศาสตร์เชิงคำนวณ)

Number of Credits: 3

Course Description :

      Solving, modeling, and simulation in various Astrophysics or Physics problems, by using numerical methods and computer programming.

Course Objective :

A student can analyze astronomical and astrophysical problems for selection an appropriate numerical method to solve the problems. Practice and solve the astronomical and astrophysical problems by the numerical method and computer programming. Enhance and improve their skill in computer programming. Explain and translate the numerical results to describe astronomy or astrophysical process. Apply the numerical method to solve another Mathematic or Physics problems.

Course Contents	No. of Lect. Hours
1. Introduction	3
–Science and computation	
–Basic Unix commands	
–Basic programing	
2. Root of an equation	1.5
3. Matrix operation	6
– Matrices in physical problem	
– Linear equation system	
– Non–linear equation system	
– Boundary–value and Eigenvalue problem	
– The shooting methods	
– Linear equation and the Sturm–Liouville problem	
4. Ordinary differential equation	4.5
5. Partial Differential equation	4.5
–Relaxation method	
–Overrelaxation method	
– Gauss–Seidel method	
6. Numerical Integration	4.5
– Trapezoidal method	