

**MAS423 / AST001 Solar System  
Key Course Objectives and Rubric  
(Semester B, 2007/2008)**

- To learn the basic structure of the solar system, the domain of its constituent populations and their physical characteristics.
- To learn and understand how the dynamical structure of the solar system can be understood by the application of Newton's inverse square law of force to its constituent bodies.
- To learn and understand how the inverse square law of force gives rise to elliptical motion and how Kepler's equation can be used to find the position of an orbit as a function of time.
- To learn and understand how the circular restricted three-body problem admits an integral of the motion (the Jacobi constant) and how this can be used to define regions from which the particle is excluded. To derive the location of the five Lagrangian equilibrium points and to be able to derive their respective stability properties. To know the applications of these results to the motion of actual coorbital objects in the solar system.
- To learn and understand how an orbiting satellite gives rise to two tides per day on its parent planet and how planetary tides result in the expansion of prograde orbits. To show the physical consequences of satellite tides.
- To apply knowledge gained in other parts of the course to understanding some of the observed dynamical properties of planetary ring systems.
- To learn and understand the structure of the Solar nebula and its connection to planet formation.
- To learn and understand how gravitational, radiative and radiogenic processes affect the thermal state of a planet or satellite.
- To learn and understand resonances in the Solar System, basic theory and application to planets, satellites, minor planets and rings.
- To learn and understand the origin and evolution of asteroids and comets.

**The examination rubric reads as follows:**

This paper has two Sections, Section A and Section B: *you should attempt both Sections*. Please read carefully the instructions given at the beginning of each section.

Electronic calculators may be used. The make and model should be specified on the script. The calculator must not be programmed (other than by the manufacturer) prior to the examination.

## **Section A**

Each questions carries 5 marks (2.5 marks for each sub-part). You should attempt ALL five questions.

## **Section B**

Each question carries 25 marks. There are 4 questions.

You may attempt all questions, but only marks for the best 3 questions will be counted.