

Proposal for a new course

Course title: **Solar System Processes and Space Missions**

Course no.: SPA603

Proposer: Ishan Sharma & Deepak Dhingra

Department: Space Science & Astronomy

Credits: 9 (3-0-0-9)

Note: This will be a PG compulsory course in the Department of Space Science & Astronomy.

Course description and contents:

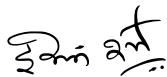
1. Introduction – 1 lecture
2. Dynamics, Physics & Astrophysics: Two- and three- body problems; Thermodynamics; Stellar properties; Nucleosynthesis – 5 lectures.
3. Solar heating and energy transport: Energy balance and transport - conduction, convection, radiation – 3 lectures.
4. Planetary atmospheres: Thermal structure; Composition; Molecular and eddy flows; Atmospheric escape – 5 lectures.
5. Planetary surfaces and interiors: Mineralogy & petrology; Interiors; Surface morphology, Impact cratering, examples. – 10 lectures.
6. Magnetic fields: Sun; Solar wind; Planetary magnetospheres – 4 lectures.
7. Formation processes: Solar System - overview and constraints; Protoplanetary disk's evolution; Growth of solid bodies and gas giants; Migration; Planetary rotation; Asteroids, comets and moons; Exoplanets; Theory and observation – 10 lectures.
8. Major Space missions and their scientific contributions – 4 lectures
9. Examples: Moon; Terrestrial planets; Gas giants – 3 lectures (if time permitting).

Textbooks

1. de Pater, I. & J. Lissauer 2019. *Fundamental Planetary Sciences: Physics, Chemistry and Habitability (updated ed.)* Cambridge Univ. Press.
2. Bertotti, B., P. Farinella & D. Vokrouhlicky 2003. *Physics of the Solar System: Dynamics and Evolution, Space Physics, and Spacetime Structure*. Springer.

References

1. Diacu, F., and P. Holmes 1996. *Celestial Encounters*. Princeton U. Press.
2. Elkins-Tanton, L. 2012. Magma oceans in the inner Solar System. *Ann. Rev. Earth Planet Sci.* 40, 113–139.
3. Faure, G. & T. M. Mensing 2007. *Introduction to Planetary Science*. Springer. *Planetary Geoscience*. Cambridge Univ. Press.
4. McSweeney Jr. H., J. E. Moersch, D. M. Burr, W. M. Dunne, J. P. Emery, L. C. Kah & M. C. McCanta 2019.
5. Melosh, H. J. 2011. *Planetary Surface Processes* Cambridge Univ. Press.
6. Rothery, D. A., N. McBride & I. Gilmour (editors) 2018. *An Introduction to the Solar System*. Cambridge Univ. Press.



Signature of the Proposer

This course is APPROVED/~~NOT APPROVED~~ Convener, DPGC

This course is APPROVED/~~NOT APPROVED~~ Chairman, SPGC

