Name of Programme: M. Sc. Applied Geology
Course Code: GEO-632
Title of the Course: Planetary Geology
No of Credits: 03
Effective from AY: 2023-24

Prerequisites for the course	Students should have undergone M.Sc. Semester I and II.	
Objective	To impart basic knowledge of the Solar system from a geologic perspective.	
Content	**Module 1** Universe, Big Bang theory, Milky Way, Solar system, sun. Terrestrial and Jovian planets, planetoids, moons. Origin of planets - condensation hypothesis, Urey's hypothesis; Evidence of early history from meteorites, asteroids, and comets. Effects of large early collisions (earth-moon system). Earth's moon, general features, geology of surface cover, volcanic flows, lunar craters. Structure of moon - crust and interior. Origin and retention of planetary atmospheres and volatiles. **Module 2** Physical attributes, atmosphere, atmospheric temperature, planetary surfaces and morphology of terrestrial planets- Mercury, Venus, Earth and Mars. Observation and exploration of the Jovian planets – Jupiter, Saturn, Uranus and Neptune. Basic planetary data of Jovian planets – physical attributes, atmospheres, surfaces and interiors; magnetic fields and structure of the planet. Geological processes affecting the solid surfaces of planets – Meteorite impacts, magmatism, tectonics **Module 3** Small bodies of the inner solar system- Asteroids and meteorites. Asteroid and meteorite types, geological processes on asteroids, zonation of asteroid belt. Classification of meteorites. Basic astronomical data of the Kuiper Belt and dwarf planets- Pluto, Eris and Ceres. Structure, composition, orbits and exploration of comets. Tools and techniques of planetary geology – Telescopes, spectroscopy, computer modelling. Indian initiatives of planetary exploration. Space crafts- Gemini series, Apollo missions, lunar rovers, first lunar landing. International Space station. Seismic method of exploration, remote sensing of physical and chemical attributes of planets.	15 hours 15 hours 15 hours
Pedagogy	Lectures/ tutorials/ assignments/ self-study	

References/ Readings	1. Beatty, J., Petersen C., and Chaikin, A., (1999). *The New Solar System*. Cambridge University Press, Cambridge, England. 2. Kaula, W.M., (1996). *Theory of satellite geodesy*. Blaisedell 3. Lodders K. and Fegley, B., (1998). *The Planetary Scientist's Companion*. Oxford University Press, New York 4. Morrison, D., (1993). *Exploring Planetary Worlds.* Scientific American Library, New York. 5. Bhardwaj A. (Ed). (2006). *Advances in Geosciences: Planetary Science (Volume 3).* World Scientific Publishing C. Pte. Ltd. Singapore. ISBN: 981-256-983-8. 6. Christiansen E. H., and Hamblin, W. K., (1995) *Exploring the Planets (2nd edition).* Prentice-Hall 7. Cook, A.H., (1973). *Physics of Earth and planets*. London: Macmillian 8. Cook, A.H., (1980). *Interiors of Planets.* Cambridge University Press, London. ISBN: 978-0-521- 23214-2 9. Gunter, F., and Teresa, M., (2007). *Introduction to planetary science: The geological perspective.* M. Springer, the Netherlands. ISBN: 13 978-1-4020-5544-7. 10. McSween Jr, H. Y., Moersch, J.E.; Burr, D.M., Dunne, W. M., Emery, J. P., Kah, L. C., and McCanta, M. C., (2019). *Planetary Geoscience*. Cambridge University Press. ISBN: 1107145384 11. Watters, T.R. and Schultz, R.A, (2010). *Planetary Tectonics*. Cambridge University Press. ISBN 978-0-521-76573-2. 12. Wilhelms, D., (1993). *To a Rocky Moon - A Geologist's History of Lunar Exploration.* University of Arizona Press, Tucson. 13. Wood, J. A. (2000). The Solar System (2nd edition) Prentice-Hall
Course outcomes	1. Students will be able to discuss the origin of the Solar System and its celestial constituents. 2. Students will understand the properties and compositions of planetary bodies. 3. Students will know the instruments and techniques used in space exploration. 4. Students will gain insights into previous and ongoing space missions.