

**Tuesday and Thursday 2:00 PM to 3:50 PM – Lectures On Line Synchronously with Recordings**

Dr. Michael Lubell E-Mail: mlubell@ccny.cuny.edu "Office" Hours  
 Mark W. Zemansky Professor of Physics Tel: 212-650-5610 or 203-261-0095 Tue, Thu (1:00-1:30 & 4:00-5:00 PM)  
 Office: MR 424 Join me on LinkedIn & Follow me on Twitter @mslubell Or by Arrangement

**COURSE DESCRIPTION**

Designed to fulfill the 30000-level core science requirement, the course covers the fundamental physical laws that underlie the motions of heavenly bodies, including Newtonian mechanics and Einstein's theory of relativity, planetary, stellar and galactic evolution; the methods, techniques and instruments used by modern astronomy, including the Hubble Space Telescope and planetary space probes.

**COURSE OBJECTIVES**

- To understand the physical principles that govern the origin and behavior of the universe and its elements, including the Earth, the Moon, the Sun, the planets, stars, galaxies and galactic clusters.
- To develop an appreciation for the history of astronomy, from ancient civilizations to the modern era.
- To gain an understanding of the experimental techniques scientists use to investigate astronomical phenomena, including terrestrial and space-based optical telescopes, radio telescopes and space probes.
- To develop capabilities for evaluating theoretical constructs based on empirical evidence.
- To develop an appreciation for phenomena that make astronomy a dazzling science, including supernovas, pulsars and black holes, and to keep abreast of new discoveries and their connection to public policy.
- To grasp the extraordinary nature of the body of knowledge scientists have developed in astronomy and cosmology and to appreciate how much still remains to be discovered and explained.

**COURSE OUTCOMES**

Demonstration of the mastery of objectives through verbal communication and written examinations.

**COURSE FORMAT**

The course will meet twice a week for 110 minutes each time. Classes will consist of Power Point presentations and on-line discussions. Although lectures will take place remotely on Zoom, student participation via real time verbal Q&A and a chat room is expected. PowerPoint slides will be posted on Blackboard, and all lectures will be recorded for asynchronous viewing. Homework consists of selected Test Yourself Questions (which will be covered in class) and Questions for Review (for individual study), as assigned on the Course Schedule.

**RESOURCES**

Required Text – *Explorations: An Introduction to Astronomy, 9<sup>th</sup> Edition* by Thomas T. Arny (McGraw Hill, New York, 2019, ISBN 1260432106) – digital version not required but highly recommended with extra credit for completing reading, available at McGraw Hill Connect (<https://connect.mheducation.com/class/m-lubell-pr-fall-2022-tuesday-and-thursday-200-350-pm>) If you use an earlier print edition, get the homework questions from the 9<sup>th</sup> edition or check Blackboard Posts

**GRADING**

Total points will be based upon the following: Exams I and II, 50 points each; one bonus point for each class participation and for timely completion of reading through McGraw Hill Connect. Exams will consist of multiple-choice and True/False questions, based on a selection of assigned Test Yourself Questions from the text as well as topics emphasized in the lectures and highlighted in the Questions for Review.

**ABOUT THE INSTRUCTOR**

Michael S. Lubell is the Mark W. Zemansky Professor of Physics at the City College of the City University of New York (CCNY) and Chair of the Aspen Institute/PBS NewsHour Partnership on Science and Society. Dr. Lubell earned his B.A. (1963) from Columbia University and his M.S. (1965) and Ph.D. (1969) from Yale University. He was a member of the Yale faculty from 1971 to 1980 before joining the Physics Department at CCNY in 1980, where he was Department Chair from 1999 to 2006. From 1994 to 2016 he also served as Director of Public Affairs of the American Physical Society. He has held fellowships from the U.S. Atomic Energy Commission, the National Science Foundation, the Alfred P. Sloan Foundation and the Deutscher Akademischer Austausch Dienst. He has also held concurrent positions at Brookhaven National Laboratory, the University of Texas-Austin, the Santa Barbara (Kavli) Institute of Theoretical Physics and Universität Bielefeld. He is a Fellow of the American Physical Society (APS) and the American Association for the Advancement of Science, and his biography appears in *Who's Who in America*, *Who's Who in the World*, *Who's Who in Science and Engineering* and *Who's Who in American Education*.

Dr. Lubell's publications comprise more than 300 articles and abstracts in scientific journals and books covering subjects in high-energy physics, nuclear physics, atomic, molecular and optical (AMO) physics, energy research and science policy. His use of polarized electrons to probe fundamental processes in atoms, nuclei and nucleons is internationally known. His science research interests now center on AMO studies of quantum chaos and simple molecular systems, energy efficiency and innovation. He has delivered more than 150 invited lectures and has appeared often on radio and TV in North America and Europe. He is one of the experts most frequently quoted by the national and scientific media on science policy issues and is credited as being one of the pioneers of science advocacy in Washington. He has served on many scientific advisory committees inside and outside government. Dr. Lubell has also been a newspaper columnist and a regular contributor to *Roll Call* and *The Hill*, two Capitol Hill newspapers. He has been active in local, state and national politics for more than forty years and has served as an advisor to members of Congress and state and national officials. His new book, *Navigating the Maze: How Science and Technology Policies Shape America and the World* was published in the summer of 2019.