**ASTR/PHYS 109: Big Bang and Black Holes**  
**Fall 2013**

**Course objectives:** This course is designed to give an intuitive understanding of the Big Bang and Black Holes, without mathematics, and de-mystify it for non-scientists. The primary goal is for students to use critical thinking about the origin and evolution of the universe and communicate their understanding using their own words to a lay audience. They will use deductive and empirical reasoning to do evidence based-decision making.

**Prerequisites:** None

**Instructor:** Prof. David Toback  
Office: Mitchell Institute (MIST), Room M425  
Email: toback@tamu.edu  
Course website: [http://faculty.physics.tamu.edu/toback/109](http://faculty.physics.tamu.edu/toback/109)

**Textbook:** “Big Bang, Black Holes, No Math,” by Toback (Web download)  
Recommended books:  
“A Brief History of Time,” by Hawking and Mlodinow  
“Theory of Everything,” by Hawking  
“Stephen Hawking's Universe,” by Filkin  
“The First Three Minutes,” by Weinberg  
Other readings to be downloaded from the web

**Course Work and Grading:** The bulk of the grade for this course is in the writing component. A premium will be placed on the ability to understand and convey the excitement about science, cosmology and the physical universe to the lay reader. Note that you cannot pass the course without completing all the assignments. Some portions of the assignments will be pass/fail, and there will be a few assignments where you will be required to pass in order to pass the course. By percentage, the grade is based on:  
- Short papers: 90%  
- In-class quizzes/pre-lecture reading questions: 5%  
- End-of-Chapter online quizzes: 5%  

Answer to frequently asked questions about grading can be found at [http://people.physics.tamu.edu/toback/109/109FAQ.shtml](http://people.physics.tamu.edu/toback/109/109FAQ.shtml)

**Students in the Honors Sections:** The regular sections and honors section meet together during the regular class period. However, each honors student will have an additional Research Paper that will be part of their paper grade. More information about it can be found at [http://faculty.physics.tamu.edu/toback/109/honors.shtml](http://faculty.physics.tamu.edu/toback/109/honors.shtml)

**Description of the writing instruction:** Each paper assignment will submitted online and graded using the Calibrated Peer Review system (cpr.tamu.edu) which we will refer to as CPR. Many students find using CPR to be the most difficult and unpleasant portion of the course. The instructor believes reviewing papers, as a way of learning to critique your own work, is the most
important part of the class and one of the best ways to improve your writing. We will spend time discussing each paper in class.

We are here to help you get excellent grades if you will put in the time and effort required. Before each paper is due, students will be encouraged to submit drafts to the TA for feedback with enough time for the TA to respond with comments. This will help produce an excellent final draft paper. Getting help from the TA’s during both the writing and the Calibration stages of CPR will be encouraged. In the case that you don’t get the grade you want on the full paper score, you will be encouraged to resubmit your paper. However, doing so requires doing the full the CPR process again. In general, we will take the average of the two scores as long as the first draft shows a "good-faith" effort. Exceptions will be made in rare cases.

Since many students are not used to working with the CPR system, the first paper will be graded pass/fail. A student must pass both the text portion as well as the Calibration stages in order to pass the assignment. Students will be required to resubmit the first paper until they receive a passing grade in order to pass the course.

**ADA Policy:** The American's with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Disability Services in Cain Hall B118, call 845-1637, or e-mail disability@tamu.edu. Additional information is available at http://disability.tamu.edu.

**Honor Code:** The Aggie Honor Code states, “An Aggie does not lie, cheat, or steal or tolerate those who do.” Further information regarding the Honor Council Rules and Procedures may be found on the web at http://www.tamu.edu/aggiehonor. The plagiarism statement for the course can be found at http://faculty.physics.tamu.edu/toback/109/WritingAssignments/plagiarism.shtml

**50-Word Summary:** This course is designed to give an intuitive understanding of the Big Bang and Black Holes, without mathematics, and de-mystify it for non-scientists.