

AST301: Cosmic Catastrophes (AKA Collisions)

Spring 2017

TuTh 1:00-2:20, Phys. 113

- Instructor: James Lattimer (email James.Lattimer@Stonybrook.edu)
 - Office: ESS 461; office hours are M, W, F 2:00 - 3:00
- Course URL is <http://www.astro.sunysb.edu/lattimer/AST301/>
- Required texts: “Cosmic Catastrophes” by Wheeler; “Disturbing the Solar System” by Rubin; “Extreme Explosions: Supernovae, Hypernovae, Magnetars, and Other Unusual Cosmic Blasts” by Stevenson
- Supplementary material (not required) “The Life and Death of Planet Earth” by Ward and Brownlee; “Rare Earth” by Ward and Brownlee.

Supplementary books and Stevenson’s book (not needed until the last half of the course) were not ordered, but can easily be found on Amazon.com, bookfinder.com or addall.com. They are provided as assistance for homework problems and for class reports.
- Abstract: This course will focus on collisions that occur in the solar system, ranging from those in the early solar system, which affected planetary orbits and spins and also produced the Earth’s moon, up to the impactors, including meteorites, asteroids and comets, that threaten the Earth today. In addition, other catastrophic events occurring both in the solar system and in the rest of the universe that could impact life on Earth are explored. Within the solar system, these include, besides impacts, solar activity, tectonic and volcanic activity, magnetic field reversals, and ice ages. The effects of future climate changes, and mankind’s role in causing them, are discussed. External threats investigated include radiation from supernovae, explosions on neutron stars, and gamma-ray bursts; these events could have affected the Earth in the past. Risk assessment is an important component of this course; should we try to prevent or mitigate climate change and impacts?
- Exams: There are no exams for this course.
- Homeworks: There will be about 10 homework assignments that will count for 40% of your final grade. Homeworks will be posted on Blackboard and the course website the week before their due date. They must be submitted to Blackboard before the due date and time; multiple submissions are accepted if you want to revise your submission. I am not opposed to groups working on homeworks together, especially for researching, but this must be limited to discussions among yourselves. The submitted homeworks are to be your own creation and you must not plagiarize from one another or from your sources.
- Reports: Three class reports will each count 20% of the total grade. The due dates for the reports are February 23, March 23 and April 20, and they are to be submitted to Blackboard. Late papers will be downgraded 1 letter grade

for each week they are overdue. You will be expected to give a short oral summary of your report to the class during the two or three classes following the due date; I will assign these dates after you submit your report to Blackboard. These summary presentations should be about 15 minutes in length, and you can use the blackboard or a computer to assist your presentation. If using a computer, and you want to use your own Apple, you must bring the video adaptor; otherwise just send me a PDF. Your paper grade will be based primarily, but not exclusively, on your written report.

Suggested topics for the first term paper will be posted on Blackboard during the first week of classes, or you can propose to me alternant topics if you wish. Suggested topics for the second and third topics will be posted during weeks 4 and 7, respectively. The topics must reflect the course material and themes from the syllabus for each part of the course ending at the due date.

Their length should be about 8 double-spaced typed pages, not counting figures and tables, but this is not a hard and fast rule. I am happy to discuss your paper or look at an outline during office hours or other arranged times at your convenience. For each paper, it is expected that you should find appropriate sources. Books and magazine or newspaper articles are acceptable, as are internet web pages if you identify them and conclude they are providing reliable information. TV documentaries are not acceptable sources of information. Your report should not use the required or supplementary texts as primary references; this will lead to downgrading.

Footnotes and detailed referencing are not required, but your paper must include a bibliography containing the sources from which material was taken. If you use figures or tables, you must identify their source. The papers will be graded on the basis of originality, effort, clarity, and relevance to the course. Book reports or rehashes of class notes or readings are not acceptable.

- Plagiarism - Copying from currently or previously submitted papers or homeworks, copying directly from the WWW without attribution, or copying part of an article or book without reference will result in an "F" for the report or homework and a complaint will be filed with the student judiciary.
- If you have a physical, psychological, medical or learning disability that may impact your ability to carry out assigned course work, contact the staff in the Disabled Student Services office (DSS), 128 Educational Communications Center, 632-6748/9. DSS will review your concerns and determine with you what accommodations are necessary and DSS will advise me. All information and documentation of disability is confidential.

Stony Brook University expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to observe national, state, and local laws and University regulations; and to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, and/or inhibits students' ability to learn.

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to www.stonybrook.edu/uaa/academicjudiciary/.

AST 301 – Cosmic Catastrophes (AKA Collisions) – Syllabus				
Date	Chapters			Topic
	R	W	S	
Jan 24	1	1	1,2	General Introduction
Jan 26	1,2	–	–	Origin of Solar System
Jan 31	3	–	–	Heat Sources
Feb 2	6	–	–	The Moon and its Origins
Feb 7	–	–	–	Comets
Feb 9	7,8	–	–	Asteroids
Feb 14	9	–	–	Meteorites
Feb 16	10,11	–	–	Craters
Feb 21	12	–	–	The K-T Extinction
Feb 23	13	–	–	Impact Rates and Catastrophes
Feb 28	–	–	–	Impact Mitigation
Mar 2	4	–	–	Magnetic Earth
Mar 7	5	–	–	Ice Ages and Climate Change
Mar 9	–	–	–	Volcanos and Earthquakes
Mar 14	–	–	–	Spring Break
Mar 16	–	–	–	Spring Break
Mar 21	–	–	–	Solar Flares and Activity
Mar 23	–	–	–	The Climate Change Debate
Mar 28	–	2,3	–	Binary Stars and Roche Overflow
Mar 30	–	4	–	Accretion Discs
Apr 4	–	5	–	White Dwarfs and Novae
Apr 6	–	6	11	Thermonuclear Supernovae
Apr 11	–	7	2,3	Core Collapse Supernovae
Apr 13	–	13	14,15	Supernovae and Life
Apr 18	–	8	–	Neutron Stars
Apr 20	–	8	–	Neutron Stars
Apr 25	–	–	–	X-Ray Bursts and Magnetar Flares
Apr 27	–	11	4,5	Gamma-Ray Bursts and Hypernovae
May 2	–	11	–	Compact Object Mergers
May 4	–	9,10,14	–	Galaxy Collisions and Black Holes

R=Rubin; W=Wheler; S=Stevenson; **Bold dates** are due dates for papers