Eyes to the Universe: A Full Spectrum View of Our World
First Year Seminar A19, Fall 2016

Explanation (from Astronomy Pic of the Day 2016 July 08) : At the core of the Crab Nebula lies a city-sized, magnetized neutron star spinning 30 times a second. Known as the Crab Pulsar, it's actually the rightmost of two bright stars, just below a central swirl in this stunning Hubble snapshot of the nebula's core.

With more mass than the Sun and the density of an atomic nucleus, the spinning pulsar is the collapsed core of a massive star that exploded. The Crab Nebula is the expanding remnant of the star's outer layers. The supernova explosion was witnessed on planet Earth in the year 1054.

Image credit: *Image Credit: NASA, ESA - Acknowledgment: J. Hester (ASU), M. Weisskopf (NASA / MSFC)*.

Class time and location: Mon, Wed 12:30-1:50 pm @ Science Center 1343

Instructor:

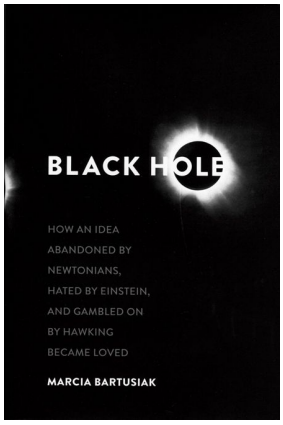
Prof. Dipankar Maitra
Email: maitra_dipankar@wheatoncollege.edu (*best way to reach me*)
Office: Science Center 1330 (*come in whenever the doors are open*)
Phone: x5697 (*mostly untested technology, stay away*)

Office Hours: Tu/Th 10am - 12noon or email.

Course Goals: Our quest to understand the nature of things, from microscopic atoms to stars and galaxies, relies heavily on the light we receive from these objects. Even the discovery of exotic objects such as black holes and dark matter, which by themselves do not emit any light, relies on light produced by objects near them. In this seminar we will explore properties of light in general, not just visible light but the whole spectrum ranging from radio waves to gamma-rays. In this hands-on, project-based course we will learn about how mirrors, lenses and cameras work, visit laboratories to see and learn about microscopes, and use telescopes in our observatory to study the treasures of the night sky. Making use of Wheaton's *Makerspace* facilities, we will design and build instruments and use them to explore nature.

- I encourage you to approach me with any kind of questions as soon as they arise, and to attend the office hours if you need assistance.
- Collaboration with classmates is also highly encouraged.
- If at any point in the lectures or lab you are confused or we are moving through the material too quickly, do not hesitate to ask a question. If you have a confusion, someone probably else does too, and far from judging you, we will respect you for thinking critically, speaking up, and taking ownership of your education.

Course Book: "***Black Hole: How an Idea Abandoned by Newtonians, Hated by Einstein, and Gambled on by Hawking Became Loved"***, by Marcia Bartusiak. Yale University Press. Additional handouts and/or online readings will be given during the class.



Website: An onCourse site has been established for the course; please check it regularly for information about the class/assignments/lab, etc.

Communication: I will be using email extensively to communicate with everyone. We will not be FaceBook-ing, tweeting, instagram-ing and such. ***Please check your email frequently.***

Attendance Policy: Class attendance and participation is expected. Absences for school-sanctioned events will be excused. Please know that it is your responsibility to inform me in case of absence due to serious or prolonged illness.

Grading scheme:

- Reading assignment summary, unanswered questions ……..... 30%
- Active class participation: …….. 10%
- Labs: ……..……..…… 35%
- Technology literacy ……...……... 5%
- Presentations:
    - Team presentation: ……..……... 8%
    - Paper on presentation: ……..….. 8%
    - Peer-evaluation of presentations: ……..…. 4%

Exams: There will be no exams.

Reading assignment summary and unanswered questions: Reading assignments for the upcoming topic/text chapter will be posted on onCourse. Please go through the relevant parts of the text and submit a summary of at least 100 words, *AND* at least three things that were confusing/not clear to you.

Active Class Participation:

- includes taking part in problem solving, class discussions etc. The learning process requires your dedication and involvement; it is not just the instructor lecturing to you. Your active participation in class is required, not just expected.

Labs: Labs, done in groups of 2-3 students, will incorporate hands-on activities. Lab reports need to be handed back at the end of each lab.

- *If you miss three labs and are unexcused, you will fail the course.*
- *A lab for which you do not turn in any work constitutes a missed lab.*

Team presentations: Early in the semester, students will be randomly assigned to work in teams of two. Teams will work together on projects in class and also give a team presentation near the end of the semester. The topics for the presentations will be decided by lottery during the middle of the semester.

Paper on team presentations: Will be based on the presentation given by you and your teammate. Both team members will collaborate and write a single paper (1500 words minimum, plus references, figures, graphs, plots, images, tables etc.).

Peer-evaluation of presentations: Evaluate presentations of at least 4 other teams. Take short notes (e.g., good points, what you learned, what could be improved, etc.) on a form that we will hand out.

Grading Scale: You will not be graded on a curve. Your grades will be scaled according to the table on the right. This absolute scale is designed, in part, to encourage you to work together. Please help one another inside and outside of class!

Grade	+		-
A	**>96**	**92-96**	**88-92**
B	**85-88**	**81-85**	**77-81**
C	**72-77**	**67-72**	**63-67**
D	**60-63**	**56-60**	**52-56**
F	**<52**		

Late Work Policy: Except in case of lateness due to illness or school-sanctioned events, homework and labs must be turned in by the stated deadline to get full credit. Every week's worth of delay will cost 10% of the maximum score. E.g. if you turn in a lab/HW (that is originally worth, say, 10 points) 3 weeks late, then you can get only 7 points max for that HW.

Academic Integrity and Honor Code: I encourage you to work together on homework assignments, but straight copying of someone else's work is a violation. When in doubt, please acknowledge the work of the students that you studied with. Signing another person's name on an attendance sheet is an Honor Code violation.

Accommodations: Wheaton is committed to ensuring equitable access to programs and services and to prohibit discrimination in the recruitment, admission, and education of students with disabilities. Individuals with disabilities requiring accommodations or information on accessibility should contact Abigail Cohen, Disability Services Specialist at the Filene Center for Academic Advising and Career Services (cohen_abigail@wheatoncollege.edu or 508-286-3794).

Class Schedule (Tentative)		
Date	**Topics**	**Read chapt/sec**
08/31 W	Introduction; Discuss the book you read.	SummerQ4
09/05 M	*Labor day. No classes.*	
09/07 W	**Lab: Creating images with pinholes** +Tell us about the constellations you found.	SummerQ2
09/08 to 09/13	* 09/08 midnight: Last day to "Test Out" technology literacy modules * 09/12 or 09/13, 5-6pm or 7-8pm: Technology Literacy with Jenni Lund	
09/12 M	Special class: Learn about "Library Research Basics" with Cary Gouldin	
09/14 W	It Is Therefore Possible ...	ch. 1
09/19 M	Joint Lab: 3D printing/Molecular modeling/Microscopy	
09/20 to 09/22	* 09/20 or 09/21 or 09/22, 7-8:30pm (sign up for one session) Advising 101 with Dean Viveiros	
09/21 W	Special class: Learn about "Academic Integrity & Citations" with Cary Gouldin	
09/25 Sun	Dinner with President Hanno at his place from 5:30-7pm	
09/26 M	Newton, Forgive Me	ch. 2
09/28 W	**Lab: Creating images with lenses**	
10/03 M	Joint Lab: 3D printing/Molecular modeling/Microscopy	
10/05 W	One Would Then Find Oneself ...	ch. 3
10/10 M	*October break. No classes.*	
10/12 W	**Lab: Reflection and Refraction** + Your reflections on an object of art	SummerQ1
10/17 M	There Should Be a Law of Nature ...	ch. 4
10/18 to 10/20	* 10/18 or 10/19 or 10/20, 7-8:30pm (sign up for one session) Advising 102 with Dean Viveiros	
10/19 W	**Lab: Pinholes and lenses**	
10/24 M	I'll Show Those ...	ch. 5
10/26 W	**Lab: Telescopes**	
10/31 M	Only Its Gravitational Field Persists … ● **Guest lecture by Dr. Jack Steiner (MIT) from 5pm.**	ch. 6
11/02 W	**Lab: Break a telescope, make a telescope**	
11/07 M	I Could Not Have Picked a More Exciting Time ...	ch. 7
11/09 W	It Was the Weirdest Spectrum ...	ch. 8
11/14 - 17	**Team Presentations, during class** ● **Guest lecture by Prof. Marcia Bartusiak from 5pm on 11/14.**	
11/21	Joint Lab: 3D printing/Molecular modeling/Microscopy	
11/22-23	*Thanksgiving break. No classes*	
11/28 M	Why Dont You Call It a Black Hole?	ch. 9
11/30 W	**Lab: Interference and/or Polarizarion**	
12/05 M	Medieval Torture Rack	ch. 10

12/07 W	Whereas Stephen Hawking ...	ch. 11

- Field trip to MIT Haystack Observatory and MIT Wallace Observatory:
  - **Nov 18 Friday**

  We'll leave Wheaton at 12:30 and be back ~6pm.

FYS Assignment: Excel and Powerpoint Literacy

You will use these programs frequently during your college education. Having a solid mastery of the basics will be useful for many years to come.

1. Do you have a laptop with Microsoft Office on it? If yes, skip to step 4, below.
If you do not have a laptop, please skip to step 4B.

2. If you have a laptop but do not have Microsoft Office:
Immediately contact LIS Tech Support to request a free copy of Microsoft Office.
Email: support@wheatoncollege.edu
(include Wheaton ID# and Wheaton email address)
Phone: 508-286-3900
Do this right away as it will take a few days to process your request.

3. Install Microsoft Office on your computer.

4. Do you think you have good skills in Excel and Powerpoint?
To ensure you have a good foundation, you have two options.

(A) Test out:
Go to the following link and download the following exercises:
http://wheatoncollege.edu/technology/technology-literacy-exercises/
-Powerpoint Basics
-FYS Excel
Follow the directions on the assignments and email them upon completion.
DUE: THURSDAY SEPTEMBER 8, MIDNIGHT
If your work on the submitted exercises indicates that you do not need to attend the session, you will receive an email on Friday September 9.

(B) Attend an evening session:
Attend one of the following four sessions on Excel and Powerpoint literacy.
Monday September 12, 5-6 PM
Monday September 12, 7-8 PM
Tuesday September 13, 5-6 PM
Tuesday September 13, 7-8 PM
If you have a laptop, please bring it with Microsoft Office already installed.
If you do not have a laptop, there will be computers available that you can use.
All sessions will be held in the Woolley electronic classroom, 1st floor library.

This assignment will contribute to 5% of your course grade.