ASTRONOMY 117—COSMIC EVOLUTION:
THE SEARCH FOR EXTRATERRESTRIAL LIFE

Professor Thomas M. Bania Fall 2010

LECTURES: Tuesdays (T) and Thursdays (R) in CAS 326 from 11:00 a.m. to 12:30 p.m.

OFFICE HOURS: Professor Bania's office is in CAS 514 (x3652)(bania@bu.edu). Ms. Laura Sturch is the AS117 Teaching Assistant (TA); her office is in CAS room 524 (x3-6554)(lsturch@bu.edu). Our office hours will be announced in class.

Cosmic Evolution will be based on a variety of sources including:

REQUIRED TEXTS: Copies available at the BU Bookstore. You will get a better deal at Amazon.com. Consider used texts and sharing a copy.

- *Life in the Universe*, Second Edition, 2007, Bennett & Shostak, Addison Wesley. ISBN 0-8053-4753-4
- *The High Frontier*, Third Edition, 2000, Gerard K. O'Neill. ISBN 1-896522-67-X

RECOMMENDED BOOKS: These would be useful references. Most are not at the BU bookstore. Consider used texts and sharing a copy.

- *The Search For Life in the Universe*, THIRD EDITION, by Donald Goldsmith and Tobias Owen, Addison Wesley.
- *Guns, Germs, and Steel: The Fates of Human Societies* by Jared Diamond, Norton.
- *UNIVERSE: An Evolutionary Approach to Astronomy* by Eric Chaisson, Prentice Hall. Basic astronomy with sections on Bioastronomy and SETI.
- *Are We Alone? The Possibility of Extraterrestrial Civilizations*, by Robert T. Rood and James S. Trefil, Scribners. Long out of print this is the classic text for this course.

WWW: The AS117 web site can be found from **http://blackboard.bu.edu/** with the name **10fallcasas117_a1** N.B. You **must** have an ACS account to access BlackBoard. Numerous external web sites will be identified during lectures.

- The textbook has a website: **http://wps.aw.com/aw_bennett_liu_2/**
- *Life Beyond the Earth: A Consideration of Extraterrestrial Civilizations from Without and Within*, by Robert T. Rood, Thomas M. Bania, & James S. Trefil will be used in AS117. This book draft is available on line at: **www.astro.virginia.edu/class/rood/astr342/lbe** (click on PDF format only)

GRADES: Your final semester grade will be based upon performance in the following: (1) Two In Class Exams (25% each); (2) a comprehensive Final Exam (25%); and (3) discussion section participation including attendance, homework, and other assignments (25%).

FINAL EXAM: The Final Exam will be held on Thursday, 16 December 2010 between 9:00 a.m. and 11:00 a.m. in room CAS 326.

DISCUSSION SECTIONS: Weekly discussion sections are held in CAS B04. **You <u>must</u> attend one of the discussion sections:**

Section	Day	Time	Current Enrollment (Limit is 16)
A2	R	12:30pm– 2:00pm	17
A3	M	11:00am–12:30pm	8
A4	F	12:00pm– 1:30pm	10

COSMIC EVOLUTION is an interdisciplinary course that follows the evolution of matter in the Universe, the evolution of life on Earth, the ascent of Humankind and the invention of civilization and technology. It will then discuss the search for other galactic civilizations, possible techniques for communication with such civilizations, and the future of Humankind. The goal of Cosmic Evolution is to build a scientific base from which to view all of creation and the presence of intelligent life in the cosmos. The course naturally divides into five sections:

I. The Evolution of Matter
II. The Evolution of Life
III. The Evolution of Intelligence
IV. The Evolution of Technological Civilizations
V. The Evolution of Humankind

DISCUSSION SECTIONS: The first section meets on THURSDAY, 9 Sept. 2010. Note that this means that **all** new section activities will start on Thursdays. Your performance in discussion section will comprise 25% of your final grade. You will be graded on: (1) Attendance (mandatory); (2) Participation; (3) Homework; (4) Reading; and (5) Quizzes. Below is an outline of the Discussion Section schedule. Further details will be forthcoming during section.

AS 117 — Discussion Section Schedule (Subject to Change)

No.	Week Starting	Topic or Activity
1.	6 Sept.	Introduction; Movie: *Powers of Ten*; The Green Bank Equation
2.	13 Sept.	The Green Bank Equation; Properties of Light *HW #1*
3.	20 Sept.	*Planet Earth: The Climate Puzzle HW #2*
4.	27 Sept.	The Accretion of the Earth *HW #3*
5.	4 Oct.	**Review for Exam No. 1**
6.	11 Oct.	Section A3 meets for Exam Review; others do not.
7.	18 Oct.	Spectroscopy Lab
8.	25 Oct.	*Other Worlds? The Search for Habitable Planets*
9.	1 Nov.	**Review for Exam No. 2**
10.	8 Nov.	The Lotus Mark V Ecohabitat; *HW #4*
11.	15 Nov.	*What is E.T. Made Of?*
12.	22 Nov.	**NO SECTIONS! Fall Recess week!**
13.	29 Nov.	*The Fermi Paradox*
14.	6 Dec.	**Review for Final Exam**

ABSENCES: Attendance is expected at all meetings of the course.
In the case of personal illness, first and foremost, please take good care of yourself. Do what you need to do to regain your health. Please contact me as soon as you are able so that we can work together to help get you back on track insofar as AS 117 course work is concerned. Absences due to other reasons, religious holidays, team sports, family issues, etc., must be discussed with me **before** the absence occurs. Emergencies will be dealt with on a case by case basis. It is your responsibility to make up for any course related issues that result from your absence. We shall help where we can but we will not provide detailed lecture notes. For logistical reasons, in some cases discussion section events simply cannot be reproduced.

LATE WORK: Without a valid excuse or prior arrangement, late work will be subject to the following policy: (1) less than 24 hours late: forgiven the first time, –10% for subsequent infractions; (2) 24 hours to one week late: –50%; and (3) more than 1 week late: no credit.

AS 117 — Lecture Schedule — (Subject to Change)

No.	Date	Day	TOPIC
1.	2 Sept.	R	Introduction: The Galactic Year & The Green Bank Equation
2.	7 Sept.	T	Introduction: The Scientific Method
3.	9 Sept.	R	Introduction: The Future of Humankind
4.	14 Sept.	T	**I. The Evolution of Matter:** The Four Forces in Nature; The Electromagnetic Spectrum
5.	16 Sept.	R	Atoms and Molecules
6.	21 Sept.	T	Spectroscopy; Doppler Effect
7.	23 Sept.	R	Our Place in the Universe: The Milky Way Galaxy
8.	28 Sept.	T	Giant Molecular Clouds; Star Clusters
9.	30 Sept.	R	Formation and Evolution of Stars
10.	5 Oct.	T	Formation of the Solar System; Extrasolar Planets
11.	7 Oct.	R	Origin and Evolution of the Earth Climate and the Greenhouse Effect
	12 Oct.	T	**NO CLASS! BU Monday Schedule**
12.	14 Oct.	R	**Exam #1**
13.	19 Oct.	T	**II. The Evolution of Life:** Origin of Life; Definition of Life Chemical Evolution: Miller-Urey Experiments;
14.	21 Oct.	R	Biological Evolution: Procaryotic and Eucaryotic Cells Multicellular Organisms
	**********		**MIDSEMESTER** **********
15.	26 Oct.	T	How Different Can Life Be? Extremophiles
16.	28 Oct.	R	Natural Selection and the Fossil Record; Mass Extinctions
17.	2 Nov.	T	**III. The Evolution of Intelligence:** The Rise of Mammals and the Storage of Information
18.	4 Nov.	R	Gathering and Hunting and Agriculture; Tools and Innovation
19.	9 Nov.	T	**IV. The Evolution of Technological Civilizations:** Evolution of Societies: Guns, Germs, and Steel
20.	11 Nov.	R	COSMOS: Who Speaks for Earth?
21.	16 Nov.	T	**V. The Evolution of Humankind:** SETI & CETI; Project OZMA and other Searches
22.	18 Nov.	R	**Exam #2**
23.	23 Nov.	T	**Movie: Soylent Green**
24.	30 Nov.	T	Finite Resources and Limits to Growth
25.	2 Dec.	T	The Future of Humankind: Interstellar Travel & Interstellar Colonization; Fermi Paradox
26.	7 Dec.	R	UFOs: What about those Aliens?
27.	9 Dec.	T	**Green Bank Equation Revisited: Rare Earth?**
	16 Dec.	**R**	**FINAL EXAM, 9:00 a.m. to 11:00 a.m. in CAS 316**

ACADEMIC CONDUCT:

It is your responsibility to know and understand the provisions of the CAS Academic Conduct Code. Copies are available in room CAS 105. Misconduct involves more than just cheating on the exams. All work handed in for credit must be your own. I encourage you to study together, but to submit the homework assignments separately. You may help each other to find out how to solve a problem, but you must present your own discussion and steps needed to achieve the solution. You must take care not to work so closely with a classmate that your answers are nearly identical. I MUST refer all cases of suspected academic misconduct to the Dean's Office. I will assign a punitive grade (usually an "F" or 0) for any assignment that was judged by the Dean to be plagiarized. Note that any such decision is made after a hearing before a faculty/student Academic Conduct panel.

IMPORTANT DATES:

For Fall 2010 the following dates control the add/drop process. I cannot alter any of these dates.

> Thursday, 16 September 2010, is the last date that a student can enroll ("ADD") into AS 117 for the Fall 2010 semester.
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> Thursday, 7 October 2010, is the last date that a student can withdraw from ("DROP") a class without receiving a "W" (withdrawal) on their transcript.
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> Friday, 5 November 2010, is the last date that a student can drop a class. Student will receive a "W" on their transcript.
>
> Thursday, 12 November 2010. is the last date that a student can withdraw from a class. After this date a professor CANNOT give a student a "W" grade. A letter grade MUST be awarded.