SCB 210 ORIGINS OF LIFE AND THE UNIVERSE - FALL 2014

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SCB 210 Origins of Life and the Universe is an approved general education course that meets the University's Interdisciplinary requirement. As such, one goal of the course will be for you to demonstrate the ability to think across and about disciplinary boundaries. Others goals include the abilities to think critically and quantitatively about the phenomena we encounter.

TEXT. *Astronomy*, a Pearson Custom Library publication, that contains material from the books *Life in the Universe*, by Jeffrey Bennett and Seth Shostak, and *The Cosmic Perspective*, by Jeffrey Bennett et al. You should be aware that, at present, no single textbook covers the material at an introductory level and in a balanced way. Although we have chosen a good text which touches on many of the ideas covered in the course, coverage is uneven. Some areas exceed the depth appropriate for this course, and some areas are covered only superficially. We may post additional material on D2L to complement the textbook. Thus, *attendance at the lectures is essential to your success in this course.*

Note: You are expected to have taken at least two different science courses at the high school and/or university level.

COURSE OUTLINE

- This course is a scientific interdisciplinary overview of the origin of the universe, the matter within it, the stars and planets, the more complex molecules of which living organisms are made, and processes that operated on Earth that permitted life to evolve from simple, single-celled organisms to the complex organisms existing in our era.
- In the first half of the course, we investigate the processes which led to the formation of all the matter (and energy) in the universe, how the stars formed, and how the atoms of which you are comprised were forged. These events commenced 13.80 ± 0.08 billion years ago! The story of how we can look back in time to explore the events which led to the formation of the Earth is one of the most fascinating in science. We focus on the formation of our own solar system, our own planet, and how the conditions in the early history of the Earth set the stage for the development of life.
- In the second half of the course, we discuss the possible mechanisms for the formation of simple organic molecules and how those molecules could have organized to lead to the first self-replicating cells containing genetic material. We follow the fossil evidence of life through time on Earth and how processes taking place on the planet affected life, for example, the role of plate tectonics, the buffering of oxygen when primitive bacteria produced this gas as a waste product, the conditions which fostered rapid speciation, and circumstances that nearly eradicated life several times in the past. We discuss the broad sweep of evolution and the importance of genetics to evolution, what genes are and how new genes arise. We also explore the origins of a particular organism, *Homo sapiens sapiens*.

GRADING. The University standards for grades will be followed. Your final grade (%) will be calculated by adding your total points / 180 as outlined below.

- There will be 4 exams, 45 points each (most likely multiple-choice, but we reserve the right to include short answer questions at our discretion). A missed exam can have the zero replaced by taking the optional final; see below.
- An optional comprehensive final exam (45 points) will substitute for the lowest exam score.
- If you take all five exams, we'll drop the lowest score. If you miss two or more exams, you will get zero points for each exam you miss. Each case where this happens will be dealt with on an individual basis based on the reasons for the missed exams. Valid reasons (<u>with legitimate documentation</u>) include illness, death in the <u>immediate</u> family, military service/deployment etc.)
- Please note that there is no such thing as individual extra credit in this course.

- We will not e-mail grades.
- We will round grades; for example, if you obtain a 92.5%, it will be counted as 93%; 92.4% will be counted as 92%, etc. No exceptions.

SCHEDULE OF TOPICS

Note: The listed readings are expected to be completed prior to the scheduled class session. The readings are intended to provide a foundation for topics covered in lecture, but the lectures will contain substantially more content than the readings. Thus, as stated above, *attendance at the lectures is essential to your success in this course.*

Date	Topic	Readings in text
28 Aug	Prelude; Our place in the universe	Ch. 3: pp 49-68
30 Aug	Light: processes and perspectives (1)	Ch. 3: pp 81-87
4 Sep	Light: processes and perspectives (2)	
6 Sep	Distances to stars and other objects (1)	Ch. 2: pp 23, 24; re-read Ch. 3: pp 53-56
11 Sep	Distances to stars and other objects (2)	
13 Sep	Origin of the universe	Re-read Ch. 3: pp 59, 63-67
18 Sep	Conditions in the early universe	Ch. 5: pp126-136
20 Sep	**Exam 1**	As above
25 Sep	Stellar evolution (1)	Ch. 3: pp 61, 62, 78-81
27 Sep	Stellar evolution (2); Formation of the solar system (1)	Ch. 4: pp98-115
2 Oct	Formation of the solar system (2)	
4 Oct	Earth: composition and structure of a habitable planet (1)	Ch. 6: pp 144-165
Oct 9	**Fall Break – no class**	
11 Oct	Earth: composition and structure of a habitable planet (2)	Ch. 6: pp 165-187
16 Oct	Important astrophysical processes that affect life on Earth	Ch. 8: pp 256-263
18 Oct	**Exam 2**	As above
23 Oct	What is life? A historical perspective. Life is Chemistry!	Ch. 7: pp 191-229
25 Oct	What is life? A historical perspective. Life is Chemistry! (cont.)	As above
30 Oct	The origin of life / artificial life	Ch. 8: pp 233-247
1 Nov	The origin of life / artificial life (cont.)	As above
6 Nov	Evolution in fact and theory	Ch. 8: pp 248-256; 263-274
8 Nov	Evolution in fact and theory (cont.)	As above
13 Nov	**Exam 3**	As above
15 Nov	Life as we know it (or not) / Life in our solar system & elsewhere	Ch. 9: pp 275-306; Ch. 10: pp 306-341
20 Nov	Life as we know it (or not) / Life in our solar system & elsewhere (cont.).	Ch. 9: pp 275-306; Ch. 10: pp 306-341
22 Nov	**Thanksgiving break – no classes**	
	The Drake Equation & SETI; Where are THEY?	Ch. 11: pp 343-380; Ch. 12: pp 381-418
27 Nov	The Drake Equation & SETI; Where are THEY?	Ch. 11: pp 343-380; Ch. 12: pp 381-418
29 Nov	Ceti / Extraterrestrial life – Possibilities &	To be posted on D2L

	Consequences	
4 Dec	Ceti / Extraterrestrial life – Possibilities & Consequences (cont.)	To be posted on D2L
6 Dec	**Exam 4**	As above
11 Dec	**Final exam - 8-10am – Note the time change!!!!!**	

ACADEMIC INTEGRITY

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Undergraduate Handbook, the Undergraduate Catalogue, the Ram's Eye View, and the University website at www.wcupa.edu.

AMERICANS WITH DISABILITIES ACT

If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please meet with me as soon as possible so that I can support your success in an informed manner. If you would like to know more about West Chester University's services for students with disabilities, please contact the Office of Services for Students with Disabilities which is located at 223 Lawrence Center and can be reached at 610-436-3217 and at ossd@wcupa.edu.

EXCUSED ABSENCES POLICY FOR UNIVERSITY-SANCTIONED EVENTS

Students are advised to carefully read and comply with the excused absences policy for university-sanctioned events contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

EMERGENCY PREPAREDNESS

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information and to sign up, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

INTELLECTUAL PROPERTY STATEMENT

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intellectual property of the instructor, either in whole or in part, is permitted without the prior written permission of the instructor. When such permission is granted, it must specify the utilization of the intellectual property and all such permissions and waivers shall terminate on the last day of finals in the semester in which this course is held.

Links and references to on-line resources provided by the instructor may lead to other sites. The instructor does not sponsor, endorse or otherwise approve of any information appearing in those sites, nor is responsible for the availability of, or the content located on or through, external sites. Apart from materials used in accordance with the Fair Use Act, the instructors takes no responsibility for material that is otherwise offered at web sites and makes no warranty that such material does not infringe any third party rights. However, should any of this type of material be present and this fact is brought to the attention of the instructors, they will remove references to it from course materials.