

UNIVERSITY OF MARYLAND

Life in the Universe - Astrobiology

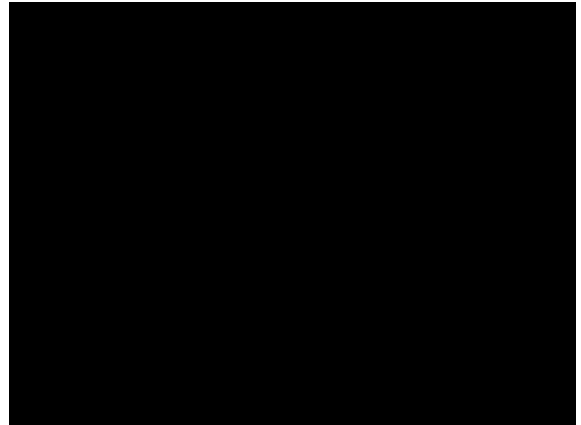
ASTR 380
Spring 2018

Home Course Description Instructor Textbook Your Work University Policies

Handouts, Answers, and More:	Welcome! Welcome to the syllabus and on-line material for ASTR 380, a 3-credit course designed primarily for non-science majors at the University of Maryland. Here you will find information about the course, the instructor, and the textbook. Study advice and ads also are included.	Recent Changes Announcements, advice, practice work, and so on will be posted here.
Class Meetings		
Study Advice		
Software and Maps	This semester the course is being taught in room ATL 2400 on Tuesday and Thursday afternoons at 2:00 - 3:15 PM by Dr. Reggie L. Hudson, a lecturer in the Department of Astronomy.	Disclaimer These pages are for educational purposes. Their content does not necessarily reflect endorsement by the University, by any state or federal agency, or by any commercial entity.
Astro-news		
Astro-links		
Easy Money!		

Pages maintained by Dr. Reggie Hudson
Last changed: January 20, 2018

Dr. R. Hudson Tu & Th 2:00 - 3:15 PM



Life in the Universe - Astrobiology

So what is astrobiology?

Dr. R. L. Hudson (Spring, 2018)

Life in the Universe - Astrobiology

Nature
Conditions
Origin
Extent

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Life in the Universe - Astrobiology

Where do we find life in the Universe?

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Life on Earth



The Microscopic

Periodic Table of the Elements

1	H																	He
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Au	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	*Ac	Rf	Ha	Sg	Ns	Hs	Mt	110	111	112	113					

* Lanthanide Series: Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
 * Actinide Series: Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr

H C O N P S

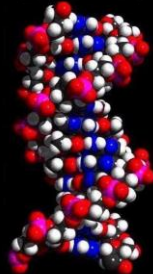
The Microscopic

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5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Au	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
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DNA
(deoxyribonucleic acid)



H C O N P S

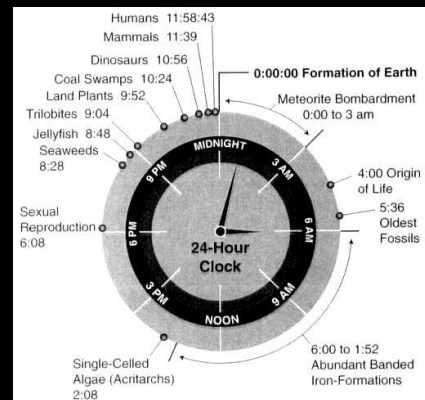
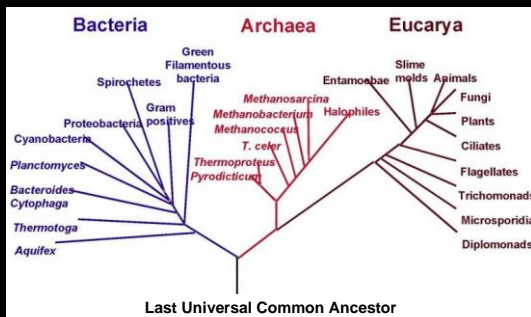
The Macroscopic



Charles Darwin

Alfred Russel Wallace

Three Domains of Life

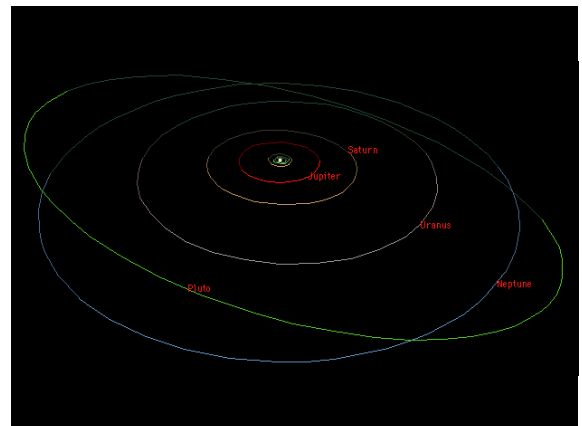
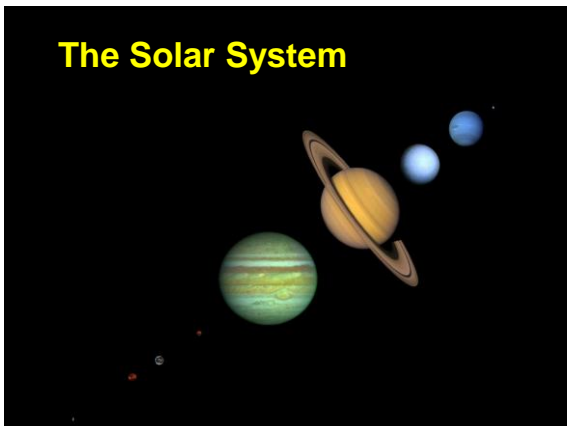


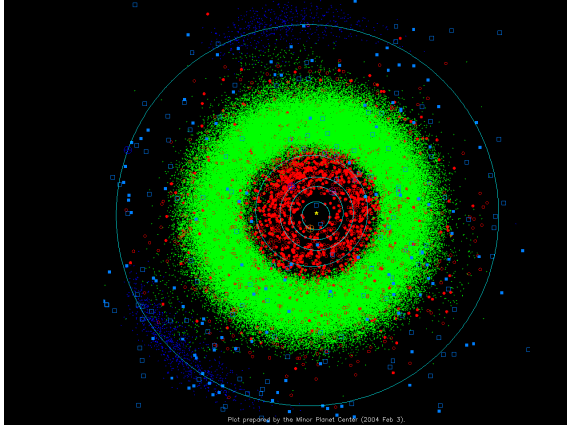


Terrestrial life involves ...

1. Very long times
2. Interplay of the microscopic (chemistry) and the macroscopic
3. Non-conventional conditions

Where elsewhere can we look for these things?






Use the Solar System to investigate ...


1. Long time spans
2. Macroscopic and Microscopic
3. Non-conventional conditions

How to Study?

Telescopes, Observatories

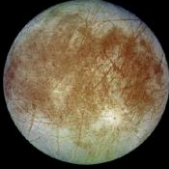



Lick Observatory



NRAO

Orbiting Spacecraft







Europa, a moon of Jupiter

Landers

Study samples from a distance





Mars



Orbiter & Lander

Saturn and Titan Cassini-Huygens Mission





Probe Landed: January, 2005

Sample Collection



Impact

Comets

Deep Impact Mission

July 4, 2005



The Milky Way Galaxy



$\sim 10^{11}$
Stars



M16 © Anglo-Australian Observatory
Photo by David Malin



M16 © Anglo-Australian Observatory
Photo by David Malin

Filter out the
red color
and rotate.



Solar System Formation

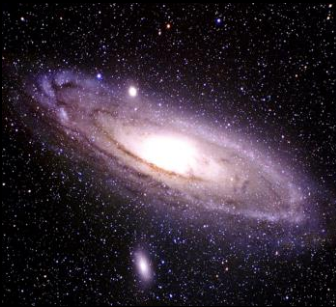


Almost 2700 Extrasolar
Systems Known

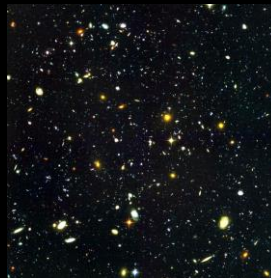
Almost 3600 Extrasolar
Planets Known

Late January 2018

Galaxies



About 3,000 galaxies here ...



extrapolates to
over a
100 billion!

Astrobiology is the study of

the nature,
the conditions,
the origin,
and
the extent of

life in the Universe.



... to be continued.

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<http://www.astro.umd.edu/~rhudson/ASTR380/>

Sources of Material

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