EPSS C179/279
Search for Extraterrestrial Intelligence: Theory and Applications
Spring 2016
WF 1:00 pm - 3:00 pm Young 4232

Course Description:

The Search for Extraterrestrial Intelligence (SETI) is based on a number of astronomical, mathematical, statistical, and computational principles. This course covers fundamental concepts in these disciplines in the context of SETI: abundance and architecture of extrasolar planetary systems; radio astronomy, including wave propagation and dispersion; signal processing, including sampling theory and Fourier transforms; random processes, including Gaussian and Poisson statistics, and algorithm development. During the laboratory component of the course, students design an observational program, acquire telescopic data, develop algorithms to analyze the data, and write a report on the results.

Lectures (two hours/week) are supplemented with weekly laboratory modules in a computer lab (two hours/week).

Instructor:

Professor Jean-Luc Margot
5642 Geology
(310) 206-8345
jlm@epss.ucla.edu

Teaching assistant:

Textbook:

There is no required textbook. Optional textbooks include:
Bracewell, R. The Fourier Transform and Its Applications, McGraw-Hill, 2nd edition, revised, 1986.
Bevington, R. Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill, 2nd edition, 1992

EPSS C179/279 website:

https://ccle.ucla.edu/course/view/16S-EPSSCIC179-1

Earth, Planetary, and Space Sciences C179/279:
SETI - Spring 2016

Date	Lec/Lab	Title	Computer
W Mar. 30	L01	*Introduction, motivation, logistics* *Radio astronomy fundamentals*	
F Apr. 01	L02	*Computational techniques, Python* *Celestial coordinates*	Alt-Az
W Apr. 06	L03	*Design of observing program (part 1)*	LST
F Apr. 08	L04	*Design of observing program (part 2)*	GPS
W Apr. 13	L05	*Design of observing program (part 3)*	Trav. Sal.
		Observing with Green Bank Telescope	
F Apr. 15	L06	*Observation debrief*	Map
W Apr. 20	L07	*Fourier transform, sampling theorem*	FFT
F Apr. 22	L08	*Time-frequency diagrams*	Time-Freq
W Apr. 27	L09	*Wave radiation & propagation, Doppler shift*	Voyager 1
F Apr. 29	L10	*Natural vs. artificial signals*	Shift & add
W May 4	L11	*Exoplanets, orbital dynamics*	Tree alg./Git
F May 6	L12	*Gaussian and Poisson Statistics*	Histograms
W May 11	L13	*Telecommunication principles, interference*	Excision
F May 13	L14	***Observing with Arecibo***	
W May 18	L15	*Guest lecture: Larry Lesyna*	Pipeline
F May 20	L16	*Dispersion in interstellar medium*	Pipeline
W May 25	L17	*Optical and infrared SETI*	Pipeline
F May 27	L18	*Relativity, interstellar travel, Fermi paradox*	Pipeline
W Jun. 1	L19	*Final project*	
F Jun. 3	L20	*Final project*	
		Final exam	

GRADING

Undergraduate students: grading is based on five problem sets (25%), a final exam (25%), and a final project (50%) that **will not** require implementation of algorithms for wave dedispersion and excision of radio-frequency interference. There is no mid-term exam.

Graduate students: grading is based on five problem sets (25%) and a final project (75%) that **will** require implementation of algorithms for wave dedispersion and excision of radio-frequency interference. There is no mid-term exam.

DISCUSSION SECTIONS

Students enrolled in EPSS C179/279 conduct weekly exercises in the computer lab (Young 4232).

OFFICE HOURS

Jean-Luc Margot	M 1-2 pm (consider calling ahead 310 206 8345)

THE FINE PRINT

You are responsible for all material covered in lectures or reading. A PDF version of the lecture notes will be posted on the course web page.

Academic integrity is expected at all times and violations will be reported to the Dean of students. Collaboration between students is never permitted except when explicitly allowed by the instructor. All students enrolled in EPSS C179/279 are expected to have read the relevant policies at
http://www.studentgroups.ucla.edu/dos/assets/documents/StudentGuide.pdf