

# GG 669 Formation of Solar Systems (Spring 2006)

## Instructors:



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**Time:** MWF 1:30-2:20 PM First meeting, Monday January 9

**Place:** POST 702

**Credits:** 3 (lecture)

**Enrollment:** Limited to 12

**Prerequisite:** GG 425, ASTR 630, or consent of any of the Musk- er, instructors

How did the Earth and other planets form? How common are planets around other stars, and what are their properties? These questions are at the forefront of the earth and space sciences and are the modern manifestations of questions about our origin and uniqueness that are probably as old as human consciousness itself. Observations and measurements have almost always preceded theory in this field of inquiry, and hence this course is structured according to the three “windows” through which almost everything has been learned in this field: (1) astronomical observations of the process of star and planet formation; (2) measurements of early events recorded in Solar System materials, and detection and (3) characterization of planets around other stars. Theory will be introduced at the appropriate times and in the appropriate measure throughout the course.

Two hours of the week will be devoted to lectures. The third will be presentation and discussion of a recent journal article. Each student will be responsible for one article (10% of the grade). There will be six homework assignments, approximately one every two weeks (30% of the grade). Each student must complete a small project with one of the instructors, write a report (30%), and give a presentation (30%) at the end of the semester.

### **Class schedule (provisory):**

January 9	Course mechanics (Gaidos & Krot)
January 11	The Solar System and Beyond (Gaidos)
January 13	The interstellar medium (Williams)
January 16	NO CLASS
January 18	Astrochemistry (Williams)
January 20	Cloud collapse and low mass star formation (Williams)
January 23	High mass and triggered star formation (Williams)
January 25	Journal article #1 (Williams)
January 27	Protostellar disks I: SED and accretion signatures (Williams)
January 30	Protostellar disks II: structure and evolution (Williams)
February 1	Journal article #2 (Williams)
February 3	Debris disks I: SED and images (Williams)
February 6	Debris disks II: constraints on planet formation (Williams)
February 8	Journal article #3 (Williams)
February 10	Brown dwarfs and the end of the main sequence (Williams)
February 13	New technologies and future prospects (Williams)
February 15	Introduction and classification of extraterrestrial materials (Krot)
February 17	Chondritic meteorites and their nebular origins (Krot)
February 20	Thermal structure of disks, processing of dust, IDPs (Krot)
February 22	HOLIDAY
February 24	Short-lived radionuclides, environment of Sun's formation (Krot)
February 27	Journal article #4 (Krot)
March 1	Chronology of the solar nebula (Krot)
March 3	Oxygen isotopes in the inner solar system (Krot)
March 6	Journal article #5 (Krot)
March 8	Formation of planetesimals, asteroid-meteorite connection (Krot)
March 10	Thermal and aqueous history of asteroids (Krot)
March 13	Meet with project advisors
March 15	Meet with project advisors
March 17	Meet with project advisors
March 20	Dynamic history of asteroid belt; planetary accretion (Krot)
March 22	Origin of the Earth's water (Krot)
March 24	Journal article #6
March 27-31	SPRING BEAK
April 3	Radial velocity technique and giant planet statistics (Gaidos)
April 5	Theory of giant planet formation and migration (Gaidos)
April 7	Journal article #7 (Gaidos)
April 10	Transits and properties of hot Jupiters (Gaidos)
April 12	Theory of giant planet atmospheres (Gaidos)
April 14	NO CLASS
April 17	Direct detection of young, self-luminous Jupiters (Gaidos)
April 19	Theory of giant planet evolution (Gaidos)
April 21	Journal article #8 (Gaidos)
April 24	Techniques for detection of terrestrial planets (Gaidos)

April 26	Theory of terrestrial planet formation (Gaidos)
April 28	Journal article #9 (Gaidos)
May 1	Future techniques for direct detection & characterization (Gaidos)
May 3	Terrestrial planet atmospheres, surfaces, biosignatures (Gaidos)
May 8,10,12	Student presentations