

CORE 103G
SPRING 2020
THE PROCESS OF CHANGE IN SCIENCE:
HUMAN EXPLORATION AND SETTLEMENT OF THE SOLAR SYSTEM

***** Please make sure to see me ASAP if you were not present on the first day of class *****

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Office hours: Mondays 12:00pm – 1:30pm, Tuesdays 2:00pm – 4:00pm,
Wednesdays 12:00pm – 1:30pm, *and by appointment*

Two centuries ago, it was “common wisdom” that all of the planets of the Solar System were inhabited and were each home to flourishing civilizations. Percival Lowell’s imagined observations of Martian canals in the waning years of the 19th Century further fueled this belief. Since 1965, when the Mariner 4 spacecraft found Mars to be a lifeless, barren world, our imagination has taken a new turn – that of terraforming Mars and making it habitable for humans. More recently, both science and science fiction have considered the possibility of human settlement throughout the Solar System, not just on Mars but also in the seemingly inhospitable outer Solar System.

In this course, we will consider the eventual human exploration and settlement of the Solar System not just from a scientific and technological standpoint, but also by examining the interdependencies of complex systems and the human and societal aspects of this endeavor.

We will first familiarize ourselves with the Solar System, exploring not only the planets, but also the Asteroid Belt and many of the larger moons of Jupiter and Saturn. Each of these destinations will offer unique challenges to human habitability, some of which may not be immediately apparent.

Science fiction authors have imagined human exploration and settlement of the Solar System and other star systems for centuries. Ray Bradbury’s whimsical *Martian Chronicles* continued the narrative of a dying Martian civilization popularized by Edgar Rice Burroughs’ Barsoom series. Nearly a century later, Kim Stanley Robinson’s *Red Mars* gave us one of the most thoughtful considerations of settling and terraforming Mars, and his *2312* imagined a Solar System teeming with humanity. In James S. A. Corey’s *Expanses* series, Earth and Mars are superpowers vying for the resources of the Solar System. An exploration of these and other science fiction works will supply out of the box thinking for many of the Solar System destinations we visited (and perhaps dismissed).

1. READING LIST

1. *The Martian Chronicles* (Ray Bradbury)
2. *Red Mars* (Kim Stanley Robinson)
3. *2312* (Kim Stanley Robinson)
4. *Leviathan Wakes* (James S. A. Corey)
5. *The Human Exploration of Space* (<https://www.nap.edu/catalog/6058/the-human-exploration-of-space>)
6. *The Case for Mars: The Plan to Settle the Red Planet and Why We Must* (Robert Zubrin)
7. *The Future of Humanity: Our Destiny in the Universe* (Michio Kaku)

Additional reading material, mostly consisting of short scientific papers, will be assigned during the semester.

2. GUIDELINES

2.1 Registration and administration

Your registration for this course consists of two separate parts: the lectures and discussion sections. You must register for each of them.

2.2 Disabilities

Students who need to request accommodation based on disability are required to register each semester with the Office of Disability Services and Programs (DSP). This office can be found at STU 301 with phone number 231-740-0776. A letter of verification to the instructor from the DSP is needed for the semester you are enrolled in. If you have any further questions please contact the DSP or the instructor.

2.3 Course requirements and grading

1. Regular attendance and participation in lectures and discussion sessions. Participation will count for 20% of the course grade.
2. A mandatory full-day field trip to Joshua Tree National Park and Sky's the Limit Observatory on Saturday, February 22, 2019.
3. An evening visit to Mt. Wilson observatory. Time and date TBD.
4. An afternoon visit to the IMAX at the California Science Center. Time and date TBD.
5. An in-class midterm exam covering material from the first part of the course on March 4, 2019, during class. The exam will have short-answer, fill-in, and multiple-choice questions, and will count for 30% of the course grade.
6. A final team project designing a human settlement on a solar system body. This project will count for 25% of the course grade.
7. A final exam covering material from the whole course. The final exam will count for 25% of the course grade.

3. SUPPORT

You have a variety of opportunities for support available to you.

3.1 INSTRUCTOR OFFICE HOURS

I will have three hours of office hours each week, but these office hours will be open to all of the courses that I teach. Office hours will be held in SHS 360. Most of my time is filled by teaching or office hours, but if I'm in my office during other times, you're welcome to stop by for a quick question (less than five minutes). You can also make an appointment to see me if you cannot make it to any of the office hours listed on the first page of the syllabus. In this case, it is best to contact me by email at least one day before you'd like to meet, or see me immediately after class.

3.2 ELECTRONIC ASSISTANCE

Everyone registered in this course should find a link to the course in their *Blackboard* account. All information about the course will be posted on *Blackboard* at <http://blackboard.usc.edu>.

4. OBTAINING YOUR GRADES

You will be able to access your grades in Astronomy 200 via *Blackboard* at <http://blackboard.usc.edu>.

5. FEEDBACK

Feedback regarding all aspects of these lectures is very much appreciated and welcome at any time. Please get in touch with your instructor via email, after lectures, or during office hours.

6. STATEMENT ON ACADEMIC CONDUCT AND SUPPORT SYSTEMS

6.1 ACADEMIC CONDUCT:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

6.1 SUPPORT SYSTEMS:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.

Provides overall safety to USC community. dps.usc.edu

7. SOME USEFUL DATES

January 13	Spring semester classes begin
January 20	Martin Luther King Day (University Holiday)
January 31	Last day to drop class without a mark of “W,” and last day to change enrolment option
February 17	Presidents Day (University Holiday)
March 4	Midterm exam
March 15 – 22	Spring Recess
April 3	Last day to drop class with mark of “W”
May 1	Spring semester classes end
Friday May 8, 2:00 pm – 4:00pm	Final exam

8. COURSE SCHEDULE

You should read through the relevant chapters prior to coming to the lectures each week, and review them again after each lecture before attempting the homework problems.

Week	Topic	Reading
1	Introduction / Our place in the Universe	Red Mars
2	Grand tour of the solar system	Red Mars
3	Grand tour of the solar system	Red Mars
4	Getting to the Moon and the Planets	Human Exploration of Space / The Case for Mars
5	Colonizing the Moon	The Future of Humanity
6	Exploring Mars	The Future of Humanity
7	Human Settlement of Mars	2312
8	Human Settlement of Mars Midterm exam	2312
9	Human Settlements on Mercury and Venus	2312
Spring Recess March 15 – 22		
10	Settling the Outer Planets and their Moons	The Martian Chronicles
11	Settling the Outer Planets and their Moons	Leviathan Wakes
12	Science vs. Science Fiction: Humanity in Space	Leviathan Wakes
13	Science vs. Science Fiction: Humanity in Space	Leviathan Wakes
14	Interstellar Ark Ships	
15	Final Presentations	
Final exam: Friday May 8th, 2:00pm – 4:00pm, Room TBA		