ASTR 4330/6330

ASTRONOMY SEMINAR: The Very Early Universe; Inflation and its Aftermath

Fall 2020

Professor: Loris Magnani

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Office – Dr. Magnani: Physics 238

Web Page: www.physast.uga.edu/~loris from there, follow the link to ASTR4330/6330. IT IS IMPERATIVE THAT YOU MONITOR THIS WEB PAGE AT LEAST ON A WEEKLY BASIS. Important announcements for the course will be posted there throughout the semester.

Class: Wednesday – 3:00 – 3:50 PM, Room 204B, Physics Bldg.

Office Hours – Dr. Magnani: Monday 3:30 – 5:00 PM in office, or by appointment via Zoom or Skype

Required Textbook: The Inflationary Universe – Alan H. Guth

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

COURSE OBJECTIVES

The purpose of this course is to give astrophysics majors a chance to explore in-depth a topic of the faculty’s choosing. Each faculty member has complete liberty to choose the astrophysical topic for the seminar and I have chosen the Inflationary Hypothesis in Cosmology for the Fall 2020 semester. We will review basic Big Bang Cosmology and then study the reasons why the Inflationary Hypothesis is necessary for a workable version of the Big Bang theory. We will look at the historical development of the idea and where we stand with it as of 2020. By the end of the semester the student should have a strong grasp of what the Inflationary Hypothesis in Cosmology is, why it was deemed necessary and developed, and what observational efforts have been made/are being made to confirm it.
METHODOLOGY

The objectives of the course will be achieved by having the students meet (see details below) and discuss various readings from the assigned textbook and other materials distributed during the course of the semester.

GRADING

The grading will be based on three 6-10 page essays on topics relevant to the course that will be due on Wednesday, September 30, October 28, and December 2, 2020. The topics for the essays will be announced in class well before they are due.

The essays will be read and graded on content, evidence of research and/or independent thought, and writing style. Each essay is worth 30% of the final grade with the remaining 10% assigned for class participation.

STUDENT RESPONSIBILITIES

Please make a reasonable attempt to arrive on time. If you must leave earlier than the scheduled end of class, please do so quickly and quietly. Class disruptions or distracting behavior will not be tolerated.

Ask for clarification on anything you find unclear, ambiguous, or unspecified in this syllabus. This includes both course policies and astronomical topics.

Know the rules concerning withdrawals and incompletes, published in the UGA Undergraduate Bulletin. Note that I will NOT withdraw you from the course for excessive absences.

COVID-19 GUIDELINES FOR WHEN TO ATTEND

In light of the COVID-19 pandemic, students will have to follow the University guidelines while in room 204B. These guidelines include the wearing of masks and respecting social distancing conventions. In room 204B, seats that will allow for social
distancing are designated and will be used by the students. To allow for this, given the size of the room, only half the class will meet on any given Wednesday. Thus, the class will be divided into two sections by last name. One section will attend the class in person, while the other follows the class remotely via Zoom. If your last name begins with A-H, you will be in section 1, and if your last name begins with I-Z, you will be in section 2. The tentative schedule (see below) shows which section will attend class in person each week.

We will start with section 1 attending in person on the first day of class (August 26, 2020) and section 2 will attend that first class using Zoom. Details on how to join the Zoom meeting will be sent by email to each student prior to each class.

Coronavirus Information for Students

Face Coverings:

Effective July 15, 2020, the University of Georgia—along with all University System of Georgia (USG) institutions—requires all faculty, staff, students and visitors to wear an appropriate face covering while inside campus facilities/buildings where six feet social distancing may not always be possible. Face covering use is in addition to and is not a substitute for social distancing. Anyone not using a face covering when required will be asked to wear one or must leave the area. Reasonable accommodations may be made for those who are unable to wear a face covering for documented health reasons. Students seeking an accommodation related to face coverings should contact Disability Services at https://drc.uga.edu/.

DawgCheck:

Please perform a quick symptom check each weekday on DawgCheck—on the UGA app or website—whether you feel sick or not. It will help health providers monitor the health situation on campus: https://dawgcheck.uga.edu/
What do I do if I have symptoms?

Students showing symptoms should self-isolate and schedule an appointment with the University Health Center by calling 706-542-1162 (Monday-Friday, 8 a.m.-5 p.m.). Please DO NOT walk-in. For emergencies and after-hours care, see https://www.uhs.uga.edu/info/emergencies.

What do I do if I am notified that I have been exposed?

Students who learn they have been directly exposed to COVID-19 but are not showing symptoms should self-quarantine for 14 days consistent with Department of Public Health (DPH) and Centers for Disease Control and Prevention (CDC) guidelines. Please correspond with your instructor via email, with a cc: to Student Care & Outreach at sco@uga.edu, to coordinate continuing your coursework while self-quarantined. If you develop symptoms, you should contact the University Health Center to make an appointment to be tested. You should continue to monitor your symptoms daily on DawgCheck.

How do I get a test?

Students who are demonstrating symptoms of COVID-19 should call the University Health Center. UHC is offering testing by appointment for students; appointments may be booked by calling 706-542-1162.

UGA will also be recruiting asymptomatic students to participate in surveillance tests. Students living in residence halls, Greek housing and off-campus apartment complexes are encouraged to participate.
**What do I do if I test positive?**

Any student with a positive COVID-19 test is **required** to report the test in DawgCheck and should self-isolate immediately. Students should not attend classes in-person until the isolation period is completed. Once you report the positive test through DawgCheck, UGA Student Care and Outreach will follow up with you.

**ACADEMIC HONESTY**

All students are responsible for knowing, understanding, and abiding by the academic honesty policy of the University of Georgia, which can be found online at [http://honesty.uga.edu](http://honesty.uga.edu). If you have any questions about this policy and how it pertains to your work in this course, please ask me for clarification.

*UGA Student Honor Code: "I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others." A Culture of Honesty, the University's policy and procedures for handling cases of suspected dishonesty, can be found at [www.uga.edu/ovpi](http://www.uga.edu/ovpi). Every course syllabus should include the instructor's expectations related to academic honesty.*

**Mental Health and Wellness Resources**

- If you or someone you know needs assistance, you are encouraged to contact Student Care and Outreach in the Division of Student Affairs at 706-542-7774 or visit [https://sco.uga.edu](https://sco.uga.edu). They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services.
UGA has several resources for a student seeking mental health services ([https://www.uhs.uga.edu/bewelluga/bewelluga](https://www.uhs.uga.edu/bewelluga/bewelluga)) or crisis support ([https://www.uhs.uga.edu/info/emergencies](https://www.uhs.uga.edu/info/emergencies)). If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA ([https://www.uhs.uga.edu/bewelluga/bewelluga](https://www.uhs.uga.edu/bewelluga/bewelluga)) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center. Additional resources can be accessed through the UGA App.

If you have any questions or concerns about this syllabus, please contact me.

TENTATIVE SCHEDULE & Readings (chapters refer to Guth’s book)

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<tr>
<th>Week of</th>
<th>Material</th>
<th>Which section meets</th>
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<tr>
<td>August 26</td>
<td>Introduction, logistics; <strong>section 1</strong></td>
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<tr>
<td>September 2</td>
<td>Review of Cosmology – Ch. 1-3; <strong>section 2</strong></td>
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<td>September 9</td>
<td>Review of Cosmology – Ch. 4-5; <strong>section 1</strong></td>
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<td>September 16</td>
<td>Particle physics and GUTs – Ch 6-9; <strong>section 2</strong></td>
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<td>September 23</td>
<td>Lambda – Einstein's Idea; <strong>section 1</strong></td>
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<td>September 30</td>
<td>A look at the Steady-State Theory; <strong>section 2 - Essay 1 Due</strong></td>
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<td>October 7</td>
<td>Four Problems with the Big Bang; <strong>section 1</strong></td>
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<td>October 14</td>
<td>Inflation – Guth’s book Ch. 10-11; <strong>section 2</strong></td>
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<td>October 21</td>
<td>The Higgs Field – Ch. 12; <strong>section 1</strong></td>
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**Withdrawal Deadline: Tuesday, October 27nd, 2020**

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<th>Week of</th>
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<td>October 28</td>
<td>Wrinkle in spacetime – Ch. 13; <strong>section 2 - Essay 2 Due</strong></td>
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November 4 – Observational tests – Ch. 14; section 1

November 11 – Creation – Ch. 15-16; section 2

November 18 – A Universe Ex-Nihilo – Ch. 17; section 1

November 25 – Thanksgiving Break – no class on Wednesday

December 2 – How to lose the Nobel Prize; section 2 - Essay 3 Due

December 9 – Epilogue; section 1