First Year Seminar
The Search for Intelligent Life in the Universe
Dr. Aaron Titus

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Course meets: MW, 2:00 – 3:40 PM, 102 Congdon
Office Hours: 361 Congdon (336-841-4668) or 129 Congdon
MW 10:30–11:30 AM, TTh 1:30–3:00 PM
http://physics.highpoint.edu/∼atitus/courses/fys1000/

1 My Personal Mission Statement

My personal mission is to encourage you to be a life-long, interdisciplinary learner. If you are teachable, motivated, and diligent, you will be successful.

My educational philosophy is that you learn best when you are actively engaged with the subject through activities such as reading (and answering questions about what you read), discussing, experimenting, and solving problems. Lectures are useful for motivation and synthesis, but for most students merely listening to lectures and copying lecture notes is an ineffective method to learn. It's when you study individually, think deeply about the subject, ask questions, develop ideas and test them, and subsequently dialogue with classmates and the professor that you learn the most. My role as the professor is to create an environment that promotes active-learning, to assess your learning, and to provide guidance and mentorship along the way.

I reserve the privilege to change this syllabus based on feedback from you and what I determine is best for the course. If the syllabus is updated, I will place an updated electronic copy of the syllabus on our web site.

2 Introduction to the Course

Are we alone in the Universe? This course will explore ongoing efforts to answer this question. We will study the accepted scientific views of Origins, how the Universe, including life itself, came to be. We will take a journey through the various factors that will determine the likelihood of finding another planet with intelligent life in our galaxy by exploring the factors in the famous Drake Equation. Along the way, we will look at current missions that are helping us answer some of our questions, like the Mars rovers studying the Martian terrain, the Kepler Mission looking for Earth-like planets around other stars, and the SETI Institute

which is listening for alien communication as part of its mission to explore, understand and explain the origin, nature and prevalence of life in the Universe. Finally, we will investigate claims that Earth has been visited by alien life already.

2.1 Expectations

Expect to work hard, to be challenged, to learn, and to work together. Expect to break through any struggles, doubts, and challenges, gain new abilities, accomplish new tasks, and develop analytical reasoning skills. **Expect to be lovingly pushed out of your comfort zone.**

2.2 First Year Seminar

Required of all incoming students, First-Year Seminars (FYS) are the cornerstone of High Point University's liberal arts education. By engaging students in guided explorations of important topics and enduring themes, FYS help our graduates see the excitement and value of intellectual curiosity and searching analysis of complex problems and thorny intellectual issues.[1].

Though First-Year Seminars focus on well-defined topics, the analytic, communication, and evaluative skills students develop and practice in these courses are are intended to be transferable to all of the learning they do at the university. In addition to acquiring a thorough understanding of how scholars frame and investigate research questions, students who complete an FYS should emerge as more thoughtful and skilled in using evidence-based reason to tackle difficult questions and problems that defy easy solutions.

Each First-Year Seminar includes a "Big Question." Big questions are broad, important, and timeless problems or inquiries into the nature of things that cannot be quickly solved or easily answered: What is justice? Is behavior a product of nature or nurture? How do we best reconcile prosperity with sustainability? What does it mean to be human? Though each FYS will consider a unique big question, all First-Year Seminars pursue this activity to help our students:

- Make sense of complicated ideas;
- Develop the capacity for deep thought, sustained inquiry, and careful, evidence-based reflection;
- Connect their learning across course and disciplinary boundaries.

2.3 Big Question

Are we alone in the Universe?

[1]This section is quoted from: `http://www.highpoint.edu/firstyearseminars/`

2.4 Learning Outcomes

Upon completion of the course, students can make the following statements:

1. I can engage a question of enduring and/or contemporary importance and be able to define and discuss the complexities and implications of the question.
2. I can define each factor of the Drake Equation and can articulate and support a reasoned argument for assigning a value to each factor of the Drake Equation. I can use the Drake Equation to estimate the number of planets with intelligent life in our galaxy. I can provide an operational definition of "intelligent life."
3. I can discuss major missions to find life in the Universe and can describe significant findings to date.
4. I can provide arguments and evidence for current scientifically accepted views on the origins of life as well as origins of stars, planets, galaxies, and the Universe.
5. I can provide evidence to deduce the age of the Universe, the age of the Sun, and the age of the Earth.
6. I can summarize and critique evidence for the argument that extraterrestrials have already visited Earth.

2.5 Standards-Based Grading

In this course, I want to encourage you to be a life-long learner. This requires that you develop a growth mindset. In other words, I want you to be driven by answering interesting questions, making reasoned arguments, and developing new skills and knowledge independent of grades and test scores. As a result, I will use a grading system called Standards-Based Grading (SBG) which determines grades based on your demonstration of skills and knowledge at the end of the semester and does not penalize you for not having those skills and knowledge at the beginning of the semester. In my opinion, SBG incentivizes growth instead of performance.

Instead of getting numbers, or letters, on assignments and exams. that average into a final grade for the course, there are a set of standards on which you are expected to show improvement throughout the semester. Each assignment assesses some subset of these standards, and on each standard, you will receive a number from zero ("does not demonstrate the standard") to 4 ("demonstrates sufficient mastery of the standard"). Each standard will be assessed multiple times in multiple assignments. The most recent assessment will be averaged with other assessments, but with the most recent assessment being weighted at 75%. In this way, as you improve, early poor scores will not significantly impact your grade. Your latest assessment is weighted far more than earlier assessments.

Table 1 lists the standards that will be assessed in this course. Each of these standards is tied directly to the learning outcomes. Every assignment (and many course activities) will

Table 1: Assessed Standards

Number	Type	Standards
1	Core	I can give a clear, organized oral presentation.
2	Core	I can organize thoughts into an outline.
3	Core	I can choose appropriate supporting evidence.
4	Core	I can write a coherent paragraph.
5	Core	I can use proper grammar and spelling.
6	Core	I can use numbers to support a conclusion, when appropriate.
7	Core	I can cite sources properly.
8	Core	I can complete at least 75% of assigned readings.
9	Core	I can contribute to a group.
10	Core	I can state the big question and can answer it with generalizations that show broad familiarity with class material. I can show general understanding in answering the big question.
1	Basic	I can design effective visual aids for an oral presentation.
2	Basic	I can write an annotated outline with proper structure.
3	Basic	I can develop an argument throughout a paper by articulating a chain of logic.
4	Basic	I can write paragraphs with topic sentences.
5	Basic	I can demonstrate understanding of at least 90% of assigned readings.
6	Basic	I can contribute effectively to a group.
7	Basic	I can state the positions of different sides of a debate.
1	Advanced	I can speak persuasively.
2	Advanced	I can use supporting evidence effectively.
3	Advanced	I can include references in an outline.
4	Advanced	I can determine how quantitative answers are derived or obtained.
5	Advanced	I can ask insightful questions of at least 90% of assigned readings.
6	Advanced	I can structure paragraphs well.
7	Advanced	I can argue both sides of a debate.
8	Advanced	I can present a persuasive argument in a paper.

provide an opportunity to demonstrate certain skills and thereby fulfill certain standards. These may or may not be explicitly stated beforehand. Not all standards will (or can) be assessed by every assignment.

You can track your progress through the course web site. At the end of the course, your final grade will be assigned based on your performance in demonstrating the skills defined by the standards. If you have not demonstrated at least a 4 in five "Core" standards, you will receive a D. A C will correspond to demonstrating all Core standards with at least a 4. To receive a B, you must demonstrate all the Core standards and at least five of the Basic standards (with a 4 on each standard). To get an A, you must demonstrate all the Core and Basic standards and all but one of the Advanced standards. Table 2 presents in detail how the final grade is derived from the list of standards.

I reserve the right to count multiple higher standards in place of one lower standard if it

Table 2: Grading Algorithm

Grade	Demonstrating a 4 on
F	fewer than two Core standards.
D	fewer than five Core standards.
C–	at least five Core standards.
C	at least seven Core standards.
C+	all Core standards.
B–	all Core, at least three Basic standards.
B	all Core, at least five Basic standards.
B+	all Core, all Basic standards.
A–	all Core, all Basic, and at least four Advanced standards.
A	all Core, all Basic, and at least seven Advanced standards.

is in the student's best interest.

3 Assignments

There will be five types of assignments for this course:

1. Two oral presentations.
2. Two papers.
3. An annotated outline for each presentation and paper.
4. Weekly readings.
5. Bi-weekly homework sets and reflection essays.

Each of these assignments will be explained in further detail below.

3.1 Oral Presentation

You will give two oral presentations to the class. I will provide you with a list of possible topics. You may propose your own topic, but it must be approved prior to researching and writing the paper. Each talk will be 5 minutes in length, followed by a 2-minute question and answer period.

3.2 Paper

You will write two papers for this course.

- I will provide you with a list of possible topics. You may propose your own topic, but it must be approved prior to researching and writing the paper. Your task will be to research the topic and write a 1600-word summary.
- For the second paper, you will answer the big question, "Are we alone in the Universe?" You will apply the Drake Equation, describe each factor in the Drake Equation along with relevant debate and uncertainty, and provide your values along with your reasoning for each factor. You will describe relevant missions and research, operationally define "intelligent life," and describe any findings to date. You will address claims that intelligent life has visited Earth. The paper should be at least 3200 words.

3.3 Annotated Outlines

Before work on your oral presentation or paper can begin, an annotated outline of the talk or paper must be constructed. This outline should follow an acceptable format, which will be discussed in class. It must have clear references to authoritative sources under each bullet point. For every on-line source, there should be at least one print source (online copies of print sources count as print sources). Blog posts and opinion articles are not acceptable sources, unless the point is to mention how some people react to the issue. An example of an authoritative online source might be the SETI web site or a NASA web site. Wikipedia alone is not sufficient, although Wikipedia may well point you to more authoritative sources. You should be prepared to defend any sources you have chosen.

3.4 Weekly Readings

Readings will include journal articles as well as excerpts from books such as:

1. *Beyond UFOs: The Search for Extraterrestrial Life and Its Astonishing Implications for Our Future*, by Bennett, Published by Princeton University Press, 2011
2. *Rare Earth: Why Complex Life Is Uncommon in the Universe*, by Ward & Brownlee, Published by Copernicus, 2009
3. *How to Find a Habitable Planet*, by Kasting, Published by Princeton University Press, 2010
4. *Alone in the Universe*, by John Gribbin. Published by Wiley, 2011.
5. *Life Everywhere*, by David Darling, Published by Basic Books, 2007.
6. *Origins: Fourteen Years of Cosmic Evolution*, by Neil deGrasse Tyson and Donald Goldsmith, Published by W.W. Norton and Company, 2014.

3.5 Homework

Homework questions and reflective essays may be assigned before or after class discussion on the same topic. To demonstrate that you have read a given article or book excerpt, I may ask you to upload photos of your hand-written notes on the reading assignment. I may also use quizzes at the beginning of class.

3.6 Final Exam Period

During our final exam period, you will give your second oral presentation. Our final exam is on the last day of the final exam week, on Wednesday, December 17, noon – 3 PM. **Make your travel plans accordingly because no exceptions will be made for the final exam time in accordance with University policy.**

4 Tentative Schedule

Topics in class will be tackled in the following order:

1. Introduction; checkerboard universe
2. Drake Equation: N
3. Drake Equation: R_*
4. Drake Equation: f_p
5. Drake Equation: n_e
6. Drake Equation: f_l
7. Drake Equation: f_i
8. Drake Equation: f_c
9. Drake Equation: L
10. Analyzing claims of intelligent life visiting Earth

Along the journey through the Drake equation, we will discuss missions, origins, and other topics.

Table 3: Credit Hour Justification

Activity	Weekly Time (minutes)	Total for Semester (minutes)
Lecture and in-class activities (synchronous)	200	3000
Homework/reading (asynchronous)	480	7,200

5 Course Policies

5.1 Credit Hours

In addition to attending class, students are expected to spend at least 8 hours each week engaged in out-of-class work (i.e., reading, studying, doing homework, working collaboratively, etc.) for every hour of credit earned in this course. Table 3 outlines the amount of time you should expect to spend per week and per semester both in and out of class.

5.2 Attendance Policy

During class, you will be involved in doing activities and participating in both small group and whole class discussions. Therefore, your attendance and full participation in each class period is part of meeting the standards for working in a group. Attendance will be taken daily, and I will observe your level of participation. If you have three absences, you can be placed on class attendance probation and can be withdrawn from the class upon further absences. I reserve the right to choose whether to withdraw you or not for lack of attendance.

5.3 Honor Code

The High Point University Honor Code asserts that:

- Every student is honor-bound to refrain from conduct which is unbecoming of a High Point University student and which brings discredit to the student and/or to the University;
- Every student is honor-bound to refrain from collusion;
- Every student is honor-bound to refrain from plagiarism;
- Every student is honor-bound to confront a violation of the University Honor Code;
- Every student is encouraged to report a violation of the University Honor Code.

My obligation is to promote academic integrity and to enforce the University Honor Code. This obligation includes appropriately interpreting the Honor Code, promoting conditions favorable to academic integrity, and reporting violations of the Honor Code.

I encourage collaboration on homework, and I encourage you to discuss your reading assignments. However, your hand-written notes on a reading assignment must be your own and may not be exactly like someone else's notes. You may not submit reflective essays that are identical to another student's essay. When you work together, you must cite the work of the other person. You must do your own work on papers and presentations; however, you may seek the feedback of others. Any quotes from another person must be cited. As a general rule of thumb, always acknowledge the work of others.

Violation of the honor code will be handled according to procedures outlined in the *Faculty Handbook.*

5.4 Accommodations

Students who require classroom accommodations due to a diagnosed disability must submit the appropriate documentation to Disability Support in the Office of Academic Development, 4th Floor Smith Library. A student's need for accommodations must be made at the beginning of a course. Accommodations are not retroactive.

6 Acknowledgements

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