

# ***PHYSICS OF SCIENCE FICTION SYLLABUS***

***Required reading: Dr. Kaku's Physics of the Impossible, and  
Hyperspace. Fall 2022***

## **I. Intelligent Alien Life in the Universe**

1. Drake equation and alien civilizations Aug. 25  
Miller experiment, exobiology, SETI, Fermi paradox
2. Classification of alien civilizations Aug. 30  
Kardashev scale, Type I,II,III civilizations, origin of intelligence
3. UFOs and extraterrestrials Sept. 1  
Hypersonic drive drones, Von Neuman probes

## **II. Exploring the universe**

4. Building a moon base Sept. 6  
Newton's laws, space elevator
5. Colonizing Mars and the solar system Sept. 8  
Terraforming Mars, oceans of Europa
6. Mining asteroids and exploring exoplanets Sept. 13  
Physics of asteroid impacts, discovering exoplanets

## **III. Science Fiction Hardware**

7. Lasers, light sabers, ray guns, jet packs Sept. 15  
Electromagnetic force, coherent radiation, plasma fields
8. Invisibility, teleportation, replicators, force fields Sept. 20  
Metamaterials, plasmas
9. Telepathy + telekinesis Sept. 22  
Brain-computer interphase, brain net
10. Transhumanism Oct. 6  
Genetic engineering, super humans, CRISPR technology

## **IV. Robots and AI**

11. Digital vs neural network Oct. 11  
Turing machines, thinking machines
12. Jobs and the future of robotics Oct. 13  
Asimov's laws; robots in society
13. The Singularity: will they take over? Oct. 18  
Breakdown of Moore's Law, Self-aware machines

## V. Nuclear Force

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| 14. $E = mc^2$ , fission, and fusion<br>Atomic physics, critical mass, nuclear reactors         | Oct. 20 |
| <b>Midterm Review</b>   | Oct. 25 |
| <b>Midterm</b>  | Oct. 27 |
| 15. Star ships<br>Ram jet fusion and Anti-matter engines  | Nov. 1  |
| 16. Quantum mechanics and parallel universes<br>Everett's Many Worlds theory; quantum computers | Nov. 3  |

## VI. Relativity and Beyond

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| 17. Special relativity and twin paradox<br>Minkowski space, Lorentz transformation          | Nov. 8  |
| 18. General relativity and space warps  | Nov. 10 |
| 19. Stellar evolution and black holes<br>Life and death of stars, Schwarzschild radius      | Nov. 15 |
| 20. Wormholes and Time travel<br>Exotic energy, Time paradoxes, closed time-like curves CTC | Nov. 17 |

## VII. Frontiers of Science

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| 21. Multiverse and string theory<br>Cosmology, Inflation theory, LHC, unification<br>Hyperspace | Nov. 22 |
| 22. Cosmology<br>Big Bang, microwave background, nucleosynthesis                                | Nov. 29 |

## VIII. Beyond Science

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| 23. Parapsychology and psychic phenomena<br>Near death experience, CIA studies, are psychics real?                                   | Dec. 1  |
| 24. St. Thomas' proofs of god and Type IV civilizations<br>Teleological, Ontological, and Cosmological proofs<br>Anthropic principle | Dec. 6  |
| 25. Digital and genetic immortality<br>Connectome brain project, telomeres, sirtuin genes  | Dec. 8  |
| <b>Review for Final</b>  | Dec. 13 |