

**Chapman University Freshman Foundations Course 100-45:  
Skepticism 101  
How to Think Like a Scientist (Without Being a Geek)  
Professor Michael Shermer**

In this comprehensive course on science and skepticism Dr. Michael Shermer—the founding publisher of *Skeptic* magazine, the monthly “Skeptic” columnist for *Scientific American*, and the author of ten books on science and skepticism—addresses the most mysterious, controversial, and contentious issues in science and skepticism from a quarter century of research involving: science and pseudoscience • science and pseudohistory • science and religion • science and morality • the psychology and neuroscience of belief • science and politics • science and economics • evolution and intelligent design creationism • the Baloney Detection Kit • how beliefs can be changed • how science works (and sometimes doesn’t work) from the history of science • and many specific examples of the power of belief. Using numerous examples from three decades of research on this subject, Professor Shermer will teach you how to think scientifically and skeptically, and he will show how to be open-minded enough to accept new ideas without being so open-minded that your brains fall out. This unique course meets once a week for three hours and includes lectures accompanied by in-class demonstrations, videos, magic, illusions, and examples from pop culture along with rigorous scientific research, plus student discussions, presentations, and interactions with the professor.

**Course meetings:** Tuesdays 4:00 – 6:50pm **Location:** Smith Hall, Room 204  
**Dates:** 15 weeks + finals, August 30 – December 6 (finals the 13<sup>th</sup>)

**Office Hours:** Tuesdays 3:00-4:00pm and 7:00-8:00pm and by appointment  
Contact information: shermer@chapman.edu; Phone Skeptic magazine: 626/794-3119

**Teaching Assistant:** Anondah Saide <anondah.saide@cgu.edu>

**Required Readings:**

Shermer, Michael. 2011. *The Believing Brain*. New York: Henry Holt/Times Books.  
ISBN: 978-0-8050-9125-0

Shermer, Michael. 2002. *Why People Believe Weird Things*. New York: Henry Holt.  
ISBN: 978-0-8050-7089-7

Sagan, Carl. 1996. *The Demon-Haunted World*. New York: Ballantine Books. ISBN:  
978-0345409461

Vyse, Stuart. 2000. *Believing in Magic: The Psychology of Superstition*. New York:  
Oxford University Press. ISBN: 978-0195136340

Wiseman, Richard. 2011. *Paranormality: Why We See What Isn't There*. Macmillan.

Assorted articles, essays, and reviews distributed during the semester.

### **Course Assignments Upon Which Student Grades are Determined:**

- Classroom participation in lecture discussions and review of readings (10%)
- A 700-word Opinion Editorial that applies a course subject to a current event (10%)
- An 18-minute “TED Talk” presentation on topic of student’s choice related to course OR a debate in a 2 x 2 team format on a topic provided by your professor (20%)
- Group research paper of experimental test of a paranormal, supernatural, or extraordinary claim of any kind related to topics covered in the course (20%)
- Group YouTube video of the experimental test for the research paper shown in class by the group followed by a Question-and-Answer period with the class (10%)
- 3 Exams based on readings and lectures: Two midterms and One Final: Essay questions integrating topics from the readings (10% each for a total of 30%) *Questions will be given to students in class on Tuesday, answers must be turned in by 5pm Friday to Anondah.*

### **Laptop Policy**

You can bring your laptop to class to take notes from the lectures and, if appropriate, look something up online, but you may not check email, Facebook, twitter, etc. during class. The T.A. will be sitting in the back and can see your screens. So don’t do email!

### **Plagiarism policy:**

Don’t do it! Don’t even think about doing it!! Be very careful about copying and pasting into your notes anything from any source on the Internet as you may forget later to rewrite it or reference it. I am a professional writer and editor and I can tell when the writer’s style changes even subtly, and of course thanks to Google it is as easy for me to find copied passages through a search as it is for students to copy and paste passages. The consequences are severe: class failure. Although you may and should use the Internet for your research, all work you turn in must be your own. When citing someone else’s idea, use proper documentation. If you are unsure about what constitutes plagiarism ask me first, and note the Chapman University Academic Integrity Policy: “Chapman University is a community of scholars which emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work, and academic dishonesty of any kind will not be tolerated anywhere in the university.” Just don’t do it.

### **About the Freshman Foundations Course Program:**

The Freshman Foundations Course provides students an introduction to university-level critical inquiry, anchored in the cross-disciplinary Freshman Foundations course and including the summer reading program, academic orientation, and associated co-curricular events. FFC courses focus student attention more on critical engagement, exploration, and communication related to complex issues than on mastering a body of material. The goals of the FFC program include:

- To engage students in interdisciplinary, university-level critical inquiry and reflection
- To immerse students in the intellectual world of the academy and encourage participation in the life of the university beyond the classroom
- To provide students the opportunity to work with a wide range of intellectual paradigms and the interconnection of ideas, values, and disciplinary knowledge

and methods in order to frame issues and questions that have engaged historians, philosophers, literary and fine arts critics, scientists, economists, and political theorists over the centuries

—To enable first-year students to work with a select group of faculty who are committed to supporting students in their transition to university-level inquiry

### **About the course Skepticism 101:**

How widespread are our beliefs in the paranormal and supernatural? According to a 2009 Harris Poll of 2,303 adult Americans, when people are asked to “Please indicate for each one if you believe in it, or not,” the following results were revealing:

God	82%
Miracles	76%
Heaven	75%
Jesus is God or the Son of God	73%
Angels	72%
Survival of the Soul after Death	71%
The Resurrection of Jesus Christ	70%
Hell	61%
The Virgin Birth (of Jesus)	61%
The Devil	60%
Darwin’s Theory of Evolution	45%
Ghosts	42%
Creationism	40%
UFOs	32%
Astrology	26%
Witches	23%
Reincarnation	20%

More people believe in angels and the devil than believe in the theory of evolution. Disturbing. And yet, such results match similar survey findings for belief in the paranormal conducted over the past several decades, including internationally. For example, a 2006 *Readers Digest* survey of 1,006 adult Britons reported that 43 percent said that they can read other people’s thoughts or have their thoughts read, more than half said that they have had a dream or premonition of an event that then occurred, more than two-thirds said they could feel when someone was looking at them, 26 percent said they had sensed when a loved-one was ill or in trouble, and 62 percent said that they could tell who was calling before they picked up the phone. A fifth said they had seen a ghost and nearly a third said they believe that Near-Death Experiences are evidence for an afterlife.

Although the specific percentages of belief in the supernatural and the paranormal across countries and decades varies slightly, the numbers remain fairly consistent that the majority of people hold some form of paranormal or supernatural belief. Alarmed by such figures, and concerned about the dismal state of science education and its role in fostering belief in the paranormal, the National Science Foundation (NSF) conducted its own

extensive survey of beliefs in both the paranormal and pseudoscience, concluding: “Such beliefs may sometimes be fueled by the media’s miscommunication of science and the scientific process.”

Part of the problem may be that 70% of Americans still do not understand the scientific process, defined in the NSF study as grasping probability, the experimental method, and hypothesis testing. So one solution here is teaching *how science works* in addition to *what science knows*. A 2002 article in *Skeptic* magazine entitled “Science Education is No Guarantee of Skepticism,” presented the results of a study that found no correlation between science knowledge (facts about the world) and paranormal beliefs. “Students that scored well on these [science knowledge] tests were no more or less skeptical of pseudoscientific claims than students that scored very poorly,” the authors concluded. “Apparently, the students were not able to apply their scientific knowledge to evaluate these pseudoscientific claims. We suggest that this inability stems in part from the way that science is traditionally presented to students: Students are taught *what* to think but not *how* to think.” The scientific method is a teachable concept, as evidenced in the NSF study that found that 53% of Americans with a high level of science education (nine or more high school and college science/math courses) understand the scientific process, compared to 38% with a middle level (six to eight such courses) of science education, and 17% with a low level (less than five such courses) of science education. So maybe the key to attenuating superstition and belief in the supernatural is in teaching *how* science works, not just what science has discovered.

Belief systems are powerful, pervasive, and enduring. This course synthesizes thirty years of research to answer the question of how and why we believe what we do in all aspects of our lives. In this course Dr. Shermer is not just interested in understanding why people believe weird things, or why people believe this or that claim, but why people believe anything at all. The thesis of the course is straightforward:

*We form our beliefs for a variety of subjective, personal, emotional, and psychological reasons in the context of environments created by family, friends, colleagues, culture, and society at large; after forming our beliefs we then defend, justify, and rationalize them with a host of intellectual reasons, cogent arguments, and rational explanations. Beliefs come first, explanations for beliefs follow. I call this process belief-dependent realism, where our perceptions about reality are dependent on the beliefs that we hold about it. Reality exists independent of human minds, but our understanding of it depends upon the beliefs we hold at any given time.*

The brain is a belief engine. From sensory data flowing in through the senses the brain naturally begins to look for and find patterns, and then infuses those patterns with meaning. The first process I call *patternicity: the tendency to find meaningful patterns in both meaningful and meaningless data*. The second process I call *agenticity: the tendency to infuse patterns with meaning, intention, and agency*. We can’t help it. Our brains evolved to connect the dots of our world into meaningful patterns that explain why things

happen. These meaningful patterns become beliefs, and these beliefs shape our understanding of reality.

Once beliefs are formed the brain begins to look for and find confirmatory evidence in support of those beliefs, which adds an emotional boost of further confidence in the beliefs and thereby accelerates the process of reinforcing them, and round and round the process goes in a positive feedback loop of belief confirmation. As well, occasionally people form beliefs from a single revelatory experience largely unencumbered by their personal background or the culture at large. Rarer still, there are those who, upon carefully weighing the evidence for and against a position they already hold, or one they have yet to form a belief about, compute the odds and make a steely-eyed emotionless decision and never look back. Such belief reversals are so rare in religion and politics as to generate headlines if it is someone prominent, such as a cleric who changes religions or renounces his or her faith, or a politician who changes parties or goes independent. It happens, but it is as rare as a black swan. Belief reversals happen more often in science, but not at all as frequently as we might expect from the idealized visage of the exalted “scientific method” where only the facts count. The reason for this is that scientists are people too, no less subject to the whims of emotion and the pull of cognitive biases to shape and reinforce beliefs.

This course will address these deep theoretical and psychological issues in the context of specific topics.

### **The Goals of the Skeptical Movement**

1. *Debunking.* There’s a lot of bunk and someone needs to debunk it. Like the bunko squads of police departments busting scammers and con artists, skeptics bust myths.

2. *Understanding.* It’s not enough to debunk the things that people believe. We also want to understand why they believe in the first place. Through understanding comes enlightenment.

3. *Enlightenment.* The power of positive skepticism linked to reason, rationality, logic, empiricism, and science offers us a world wonderful and awe-inspiring enough.

### **Controversy Disclaimer**

This course deals with many controversial topics related to people’s deepest held beliefs about god and religion, science and technology, politics and economics, morality and ethics, and social attitudes and cultural assumptions. I hope to challenge you to think about your beliefs in all these areas, and others. My goal is to teach you *how* to think about your beliefs, not *what* to think about them. I have my own set of beliefs that I have developed over the decades, which I do not attempt to hide or suppress; indeed, as a public intellectual I am regularly called upon to present and defend my beliefs in lectures, debates, interviews, articles, reviews, and opinion editorials. But in the classroom my goal is not to convince you of anything other than to think about your beliefs. I am often asked “why should we believe you?” My answer: “You shouldn’t.” Be skeptical, even of skeptics.

## Course Schedule & Outline in Brief

**Week 1. August 30.** Introduction to Skepticism. What does it mean to be a skeptic?

*Readings: Weird Things, Foreword by Stephen Jay Gould, Chapters 1 and 2*

*Demon-Haunted World, Chapters 1, 2, 3*

*Believing Brain, Prologue*

**Week 2. September 6.** Science and pseudoscience: The difference in thinking and the difference it makes. Pseudoscience, pathological science, voodoo science, junk science, bad science, nonscience, and nonsense

*Readings: Weird Things, Prologue, Chapters 4, 7, 18*

*Demon-Haunted World, Chapters 13, 14, 15*

**Week 3. September 13.** Evolution versus creationism and intelligent design: A case study in science and pseudoscience. What Evolution Is. Why People Do Not Accept Evolution. In Search of the Designer. The Controversy Over Creationism. Evolution on Trial: Scopes, Arkansas, Louisiana, Dover, the U.S. Supreme Court. The Case for Evolution and Against Intelligent Design

*Readings: Weird Things, Chapters 9, 10, 11*

**Week 4. September 20.** Holocaust history versus Holocaust denial: A case study in history and pseudohistory.

*Readings: Weird Things, Chapters 12, 13, 14*

**Week 5. September 27. MIDTERM 1**

Out of this World: UFOs, Alien Abductions and the Search for Extraterrestrial Intelligence (SETI): A case study in science and pseudoscience.

*Readings: Weird Things, Chapter 6*

*Demon-Haunted World, Chapters 3, 4, 5, 6, 7, 10*

*Believing Brain, Chapter 9*

**Week 6. October 4. Library “Instruction” Day, meet in Library Room 305, 4-5**

The Paranormal and the Supernatural.

*Readings: Paranormality, entire book*

**Week 7. October 11.** The Psychology and the Neuroscience of Belief. How the brain works. The Central Nervous System. The brain’s basic components. How neurons communicate. Synaptic plasticity and learning.

*Believing Brain, Chapter 6*

*Believing in Magic, Chapters 1, 2, 3, 4*

**Week 8. October 18.** The Cognitive Biases of Belief. How Thinking Goes Wrong. The Baloney Detection Kit.

*Readings: Weird Things, Chapter 3*

*Demon-Haunted World, Chapter 12*

*Believing Brain, Chapter 12*

**Week 9. October 25.** Patterns of Belief: The process of Patternicity. Patternicity: The tendency to find meaningful patterns in both meaningful and meaningless noise.

The believing neuron: how beliefs are formed out of neural networks and patterns.

Cognitive biases and beliefs. How science resolves belief conflicts.

*Believing Brain, Chapter 4*

*Believing in Magic, Chapters 5, 6, 7*

**Week 10. November 1. MIDTERM 2** Hidden Agents Everywhere: The process of Agenticity. Agenticity: The tendency to impose agency and intention into found patterns

*Believing Brain, Chapter 5*

**Week 11. November 8.** Conspiracies. The difference between conspiracies and conspiracy theories. How to tell whether or not a conspiracy theory is true (represents an actual conspiracy) or false.

*Believing Brain, Chapter 10*

**Week 12. November 15.** Science, Religion, God, and the Afterlife: What can science say about God and life after death? Science and Religion: Separate Worlds, Same Worlds, or Conflicting Worlds? The new atheism and the rise of fundamentalisms.

*Readings: Weird Things, Chapter 5*

*Believing Brain, Chapters 7, 8*

**Week 13. November 22.** Science and Morality: Can science determine human values and ethics? The Naturalistic Fallacy and Is/Ought Problem. Can science inform or determine human values? Can religion inform or determine human values? Transcendent Morality: How Evolution Ennobles Ethics, Why We Are Moral: The Evolutionary Origins of Morality. Why We Are Immoral: War, Violence, and the Ignoble Savage Within. How We Are Moral: Absolute, Relative, and Provisional Ethics. How We Are Immoral: Right and Wrong and How to Tell the Difference

**Week 14. November 29.** Science, Economics, and Politics: Can science solve social problems? Evolutionary economics. Our Folk Economics. Bottom-Up Capitalism. The Precarious Career of *Homo economicus*. Behavioral economics and neuroeconomics. Why Money Can't Buy Happiness. The moral foundations of our political and economic beliefs and social attitudes. How liberals and conservatives differ.

*Demon-Haunted World, Chapters 21, 25*

*Believing Brain, Chapter 11*

**Week 15. December 6. FINAL EXAM** What is Science and How Does it Work? How Science Doesn't Work. The history of science. The geography of science. The cosmology of science. Can science explain everything? Is science transcendent?

*Demon-Haunted World, Chapters 16, 17, 18, 19,*

*Believing Brain, Chapters 13, 14, Epilogue*

**Finals Week: December 13.**