Natural Sciences 4, Fall 2004, Final Examination Study Guide (Zellmer)

Comprehensive: Chapters 1 through 5 of Moore. Questions can come from any part of the course. New material since HE2 is on the continuing application of Hypothetical Reasoning and on Causality, including Chapter 5 of Moore and the philosophical and other information in the Causality material. Presentations since HE2: Chiropractic, Astrology, Creationism, ESP, and Psychoanalysis. Reference may be made to earlier presentations as well. Also: Amelie, Bowling for Columbine, and Baloney Detection Kits. Assigned Readings from Weird Things and Hines are also included.

December 13, 2004, 200 points (40 questions, scored on 36)

Directions: This exam is all Multiple Choice. Please record your responses on your Scantron 882 form. There is only one correct response to each multiple-choice question. Of the 40 questions, you will be scored on 36, so you can miss four questions and still get a perfect 200 points (but not more than 200).

Information: A list of the Informal Fallacies and some related critical tools and concepts introduced in this course: (These are roughly in the order of introduction; some are repeated to maintain logical groupings.)

Formal Arguments: The Issue, The Premises, the Conclusion.	Universal Generalizations	Strong and Weak Evidence
Opinions, claims, and evidence.	Statistical Generalizations	Statistical Null Hypothesis Dis-confirmation, including DNA
Begging the Question (tautology)	Fallacy of Hasty Generalization (in space or in time)	Aristotelian Determinism
False Dilemma	Fallacy of Assumed Linearity	Causation: Hume, Mill and Sartre
Equivocation (2 word meanings)	Appeal to Innumeracy	Single Cause (P causes Q)
Composition (parts --> whole)	Fallacy of Biased Sample	Multiple Cause (P1, P2, ... cause Q)
Division (whole --> parts)	Fallacy of Anecdotal Evidence	Combination Cause (P1 with P2 causes Q)
Genetic Fallacy	Fallacy of Specificity (Too Exact to Be True)	Common Cause (P3 causes both P1 and P2 and Q)
Hasty Generalization	Shooting Yourself in the Foot	Statistical inference of causation
Faulty Analogy	Fallacy of Confirming Evidence (Includes Cherry Picking and Subjective Validation)	Mechanistic explanation of causation
Appeal to Authority	Superstition	Legal assignment of causation
Appeal to the Masses	Fallacy of Label Slapping	Mill's Methods: Agreement, Difference, and Concomitant Variation.
Appeal to Tradition	Observations, Questions, and Multiple Hypotheses	Fallacies of False Cause:
Appeal to Ignorance (Appeal to Lack of Evidence)	"Why is That?": the Good Question	Post hoc ergo propter hoc fallacy,
Appeal to Invincible Ignorance	Rules of Inference (p's and q's)	Coincidence Fallacy,
Appeal to Baloney (pseudoscientific jargon, AKA "the Snow Job")	Troubleshooting Trees and Strong Inference	Common Cause Fallacy,
Appeal to Fear	*Modus Tollens* and Disconfirmation (if P implies Q, then Not Q implies Not P)	Backwards (Chaotic) Fallacy.
Appeal to the Person (*ad hominem*)	Criteria of Adequacy: Testability, Fruitfulness, Scope, Simplicity, and Conservatism	False Patterns in Random (or Vague) Data--Pareidolia
Fallacy of False Cause *(post hoc ergo propter hoc)*	"if and only if"; "Necessary and Sufficient"	Correlation does not prove Causation
Confirmational Bias (cherry picking)	Null Hypothesis - the true story	Chaotic Systems, Strange Attractors
Subjective Validation		Causation and Hypothesis Testing in the Real World (Bowling for Columbine)
Reconstructed Memories		Baloney Detection Revisited
Burden of Proof		
Inductive & Deductive		
Argument by Analogy		
reductio ad absurdum		

Don't let the length of this exam scare you (too much). The 40 questions and the above page of information take up sixteen pages of space. My computer insisted on leaving some big blank spaces for reasons known only to it, so the real length is only 15 pages. Feel better now? Don't forget to bring your 882 Scantron form.

We begin with some questions about Amelie and Bowling for Columbine, so be sure to review your notes from these movies. Know your Critical Thinking and the Philosophers we discussed. SUV's will also make an appearance.

I managed to get a lot of mileage out of some of our car stuff (groan), but we can do neat analogies, find fallacies, consider innumeracy, and even consider mechanisms of causality with these familiar examples.

Don't forget about Chaotic Causality and how small things can sometimes cause Big Changes.

I've got more than one question about the Burden of Proof, so be familiar with that.

Although the exam is comprehensive, I do have a large amount of Causality stuff on it, so be extra familiar with those concepts. Check out the terms on the right-hand column of the table above (which will also be on your exam).

I also have a large emphasis on the Hypothetical Method, since we continued to use this a lot, even during the Causality part of the course after hour exam 2, so pay particular attention to that. Bowling for Columbine will be a rich source of questions about this.

Since we reviewed using Dr. Hall's Baloney Detection Kit, I've chosen several questions from our discussion of that on the last day. Check it over. If you have lost your hard copy, it is available on BlackBoard under Course Documents.

I've dredged up a question about Inductive vs. Deductive arguments from the earlier part of the course. Also some stuff on Issues, Topics, and Formal Arguments.

A few questions make reference to Modus Tollens. I briefly mentioned this using this fancy name, but the main thing is how we can Disconfirm a Hypothesis. Look over our discussion of rain and wet lawns using P and Q, and apply this if you see this name.

I have worked in two Christmas themes, one involving Santa Claus and the Modus Tollens mentioned above; the other concerns the appearance of another familiar Christmas person on E-Bay.

At this point the exam starts skipping over the entire range of things we studied this semester, such as Reality and The Matrix, Flatland, more things from Amelie and Causation, Creationism, Superstition, and Space Aliens (who make several appearances). Several questions have to do with rating hypotheses using the Criteria of Adequacy.

Some old favorites return, such as Testimonials, Biased Samples, proper Sampling, and ways to sell "quack" medications. Our cast of characters from the Food Poisoning Incident will make an appearance, as will the use of DNA as evidence. I also have specific questions about our last few presentations that you haven't been tested on yet.

Finally, I have a REALLY LONG 40th question that has so much baloney packed into it that I could open a new section of the meat market at Costco. Don't let the snow job of scientific-sounding terms throw you. By now you should be able to cut through all of that, and recognize the most reasonable hypothesis.

See you Monday at 8:45 am.