CLASS EVALUATION FALL, 2009

ENVT 200 – ENVIRONMENTAL SYSTEMS THEORY

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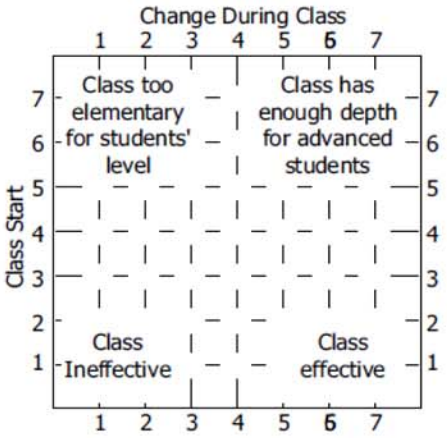
PERSONAL GROWTH

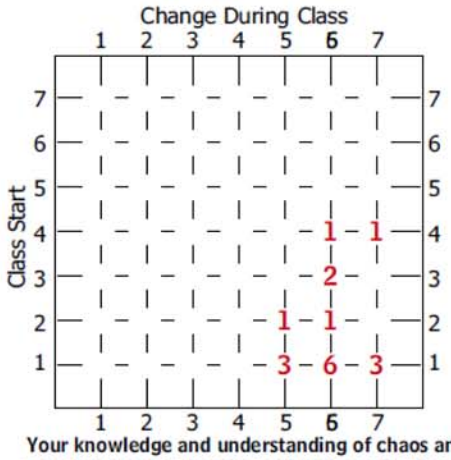
How much do you feel you grew in each of these areas from the beginning to the end of the semester (circle).

See next page of tables summarizing these questions

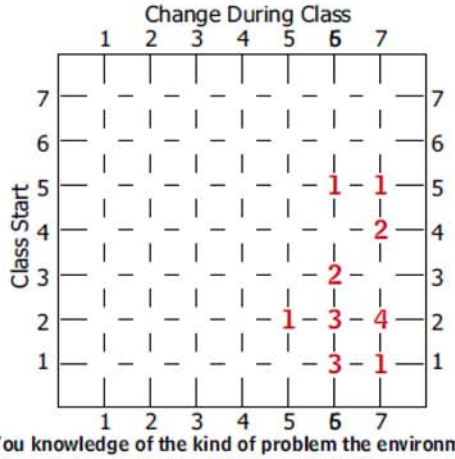
	CLASS START	CHANGE DURING CLASS
1. Your knowledge and understanding of chaos and complex systems theories and their application to environmental problems.	Little 1 2 3 4 5 6 7 A lot	Little 1 2 3 4 5 6 7 A lot
2. Your knowledge of the kind of problem the environment is, and the strategies of thinking that are apt to yield insight and understanding.	Little 1 2 3 4 5 6 7 A lot	Little 1 2 3 4 5 6 7 A lot
3. Your understanding of the processes and mechanisms that lead to the rise and fall of complex societies (perhaps including our own).	Little 1 2 3 4 5 6 7 A lot	Little 1 2 3 4 5 6 7 A lot
4. Your insight and understanding of some of the ethical issues that swirl around environmental debates, and the attitudes and motivations of individuals and peoples that drive these debates.	Little 1 2 3 4 5 6 7 A lot	Little 1 2 3 4 5 6 7 A lot
5. Confidence and competence in your intellectual tools and skills to think about complex issues that interface science and society.	Little 1 2 3 4 5 6 7 A lot	Little 1 2 3 4 5 6 7 A lot

Fall, 2009 Envt 200 - Environmental Systems Theory Fall, 2009





Your knowledge and understanding of chaos and complex systems theories and their application to environmental problems.



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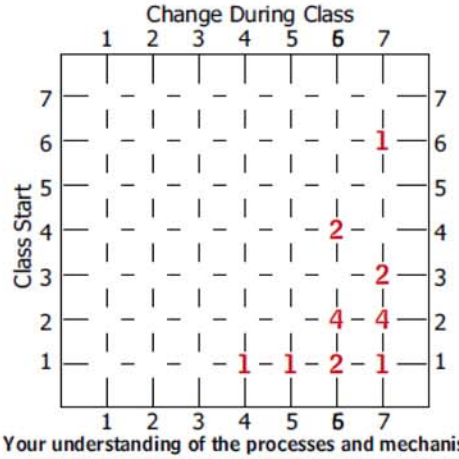

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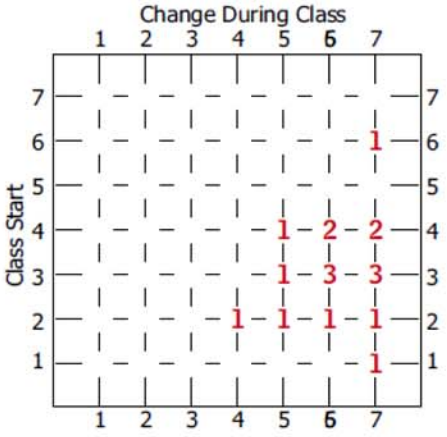

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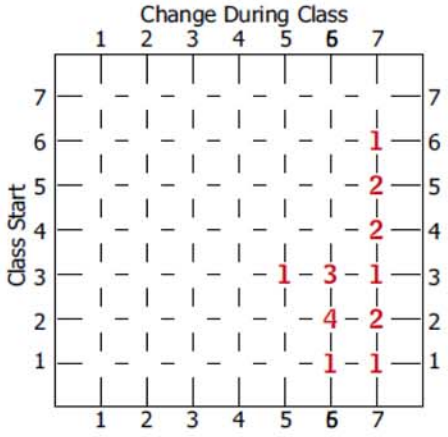

Confidence and competence in your intellectual tools and skill to think about complex issues that interface science and society.

ORGANIZATION AND EFFECTIVENESS OF THE COURSE

Please use a numerical 10 point grading scale, where 90-100 = A, 80-89 = B, etc.

Avg = 88.58	**SD = 6.6**	6. This course was carefully organized, its goals and requirements clearly stated.
Mod = 95	**Med = 90**	

Avg = 92.95	**SD = 7.01**	7. The course lectures, discussions, and experimental labs were well-prepared and presented an organized, concrete, and specific intellectual agenda.
Mod = 95	**Med = 95**	

Avg = 96.16	**SD = 3.59**	8. The course dealt with subjects and issues that I believe are centrally important to my education.
Mod = 95	**Med = 95**	

Avg = 91.32	**SD = 6.61**	9. The course was well balanced, presenting a diversity of view points and opinions.
Mod = 95	**Med = 95**	

Avg = 95.26	**SD = 4.72**	10. Compared to other classes I have taken I feel that the knowledge and skills I have gained during the course were proportional to the effort required; i.e. I gained a lot relative to the effort I was asked to put in.
Mod = 95	**Med = 95**	

YOUR PERCEPTIONS OF THE COMMITMENT OF THE COURSE LEADERS TO THE SUBJECT AND TO THIS COURSE?

Avg = 97.00	**SD = 2.96**	11. The professors displayed a solid grasp of the subject matter and gave evidence of keeping abreast of advances in human knowledge and understanding.
Mod = 100	**Med = 97**	

Avg = 94.95	**SD = 5.34**	12. This course illustrated the deeper intellectual aspects of human knowledge by demonstrating and/or advocating that knowledge is not sure but uncertain, that scholarship is search, and that doubt and skepticism are the marks of a scholar.
Mod = 95	**Med = 95**	

Avg = 95.00	**SD = 5.07**	13. Because of the interest and methods of teaching the professors had for this course I feel I have begun to understand the deeper aspects of human knowledge, have entered into its logic and sought its meaning, and above all discovered new and different ways of seeing and thinking..
Mod = 95	**Med = 95**	

YOUR PERCEPTIONS OF HOW INTERESTED THE PROFESSORS WERE IN YOU IN THE ACADEMIC/INTELLECTUAL COMMUNITY.

Avg = 97.68	**SD = 2.36**	14. Throughout this course I felt (directly or indirectly) that the professors were interested in, and supported and encouraged my growth and learning.
Mod = 100	**Med = 98**	

Avg = 95.95	**SD = 3.75**	15. The professors persuaded and challenged me to learn and understand human knowledge, i.e. the kinds of data used, assumption made, questions asked, answers expected, and the way understanding is arrived at.
Mod = 95	**Med = 95**	

Avg = 96.58	**SD = 2.83**	16. The professors persuaded and encouraged students to think, to learn, to struggle to become scholars capable of making individual contributions.
Mod = 95	**Med = 95**	

This course is an introduction to environmental systems theory. It is designed to illustrate the many topics that must be considered when thinking about the environment. But. . . . :

17. Are there any environmental systems subjects you would you like to have learned more about, or learned about in more depth, or learned less about.

- We don't have that much time.
- I am interested in government functions which were indirectly covered throughout the semester.
- Less in depth coverage of x-next! Got a little complicated @ times.
- I would've liked to have spent more time on Garrett Hardin and lifeboat ethics.
- I liked all of the topics but I wish the labs had more direction in the beginning so I could connect them to the topics.
- Fairly well balanced.
- Water depletion globally. Effects of it as well.

SUMMARY

Avg = 94.05	**SD = 5.82**	18. How important has this course been to your intellectual education?
Mod = 100	**Med = 95**	

Avg = 94.47	**SD = 4.77**	19. Summary evaluation of the course?
Mod = 95	**Med = 95**	

Avg = 97.33	**SD = 2.80**	20. Summary evaluation of professors?
Mod = 95	**Med = 98**	

If you want to write any comments, suggestions, things you liked, things you did not like, ideas that will help us teach better in the future please tell us. You can write on the back.

- Professors still delight in the destruction of innocent minds and the collapse of their fragile world conceptions.
- I understand the importance of lifeboat ethics. But, I think it should be presented from both sides. The 1st day of discussion was a little depressing ☹. I liked reading it, but felt discouraged by it after discussion day 1. Day 2 was much more realistic.

  Otherwise, all class topics were new ideas and I enjoyed gaining a new perspective. One of the most interesting classes I have ever taken! ☺ Would recommend it to others!
- Both of the professors were extremely intelligent and wonderful teachers. I enjoyed the class thoroughly.
- Professors made the class, but the class should be taken by <u>all</u> college students before graduation.
- I learned a lot in this class. Both professors showed enthusiasm plus an obvious interest and care in the topics.

Responses to the query: ***Describe something you learned from this class that has had a strong impact on you, and that will have lasting value for you.***

- The thing that I have learned in this class that has had the most impact on me is the effect of humans on earth—the environment. One of the first days in class this semester we discussed how different scientists view the earth. Lovelock stated that you have to think about the environment as a whole, not as separate entities. Everything—temperature, the current weather patterns, the living and non-living things that inhabit the earth—are all interconnected. My awareness of the earth in its entirety has become significantly more broad and knowledgeable. I am much more aware of how the impact of humans in particular will most likely have severely detrimental effects, for the earth is a complex system, and because of this, it is unpredictable and constantly in flux.

  I have a much better understanding of the earth's environmental systems, plus the fact that they are sensitive dependent and can change very quickly and unpredictably. We are at an environmental tipping point—a point at which global climate chan change irreversibly from one state to another. With this understanding, I am now also much more aware of the current status of the environment. I was very interested and shocked to learn about how greatly the ozone depletion and other human caused environmental changes have and will negatively effect the environment, effects such as skin cancer and cataracts as well as environmental effects such as drastic rise in sea levels, water pollution, coral bleaching, and fish extinctions. The discussion we have had in class have really opened my eyes to the complexity and criticality of the earth's environment and the effects the human population has had on its ability to remain stable.

- In this class I learned multiple theories about the environment. I may not remember the specifics about each theory but I will remember the big picture science, or at least environmental science, is not black and white. There are no true answers for how a complex system like the environment will behave and it is okay not to know. At first not knowing freaked me out, but then you realize that it's the natural way. Unlike the science I was taught in high school, this class proved that not everything can be predicted and that not everything has to have an answer.

- What I learned that will have the greatest impact on me is that the human population is causing irreversible damage to the Earth and using resources faster than they can be replaced, which will inevitably lead to a collapse of not only our country, but Earth as a whole. Since all systems are interrelated, out country can cause environmental damage that will cause negative impacts for the other countries and vice versa. I also realized how critical our country could be right now—illustrated in the collapse of complex societies diagram—since the US resembles many qualities of a society at tipping

point. See chart for further explanation. If you look at tipping point characteristics, we have learned that the US matches those. For example, 70% of our bridges are about to fail, but aren't getting fixed. Another example is in decreasing marginal returns—people in US work more and more hours for less and less returns.

Also, since realizing the damage we have caused I am motivated to try and decrease my behaviors that cause harm to the environment. Seeing the giant ozone hole, learning about the thermocline and how glaciers melted and add water to the ocean that could cause it to stop circulating, etc. have made me realize how bad a state the Earth is really in.

- What had the strongest impact on me was the fact that every society eventually collapses. I tend to think, when will it happen to us? It fascinates me that such sophisticated societies have disappeared completely. When will it happen to us? How will it happen to us? Will my lifeboat sink? When I ask these questions I think of all the societies of the past that we discussed and try to make connections between them and our society now. Will I see our collapse in my life time? Are we already beginning to collapse? The environmental changes are a factor as well. I really enjoyed this section. When learning about the societies of the past it was almost like trying to solve a mystery, and that's the whole fun of it.

- what I have learned in this class that has strongly impacted me is this: the environmental tipping point is approaching . . . and fast. The single most influential variable that drives a complex system is population. Human population is expanding at an <u>exponential</u> rate. Next, we are part of the environment. There is no separation. This mind set is probably a result of western culture and technology. What we believe does not entail our beliefs are true. We impact the environment and in turn it impacts us. As it stands currently, were fucking shit up real bad. If we do not change our beliefs and actions in regard to the environment soon then our extinction will be our own fault. There is nothing honorable in committing suicide, especially if you do it blindfolded. We can see what's happening if we open our eyes. Coral reef ecosystems, for example, are canaries in a coal mine. They are incredibly sensitive to the environment (only 1 ½ degree change in water temperature can kill them) and it is projected in as little as a decade they could all be extinct. We are not canaries but we are also not invincible. If the environment reaches its tipping point it will be too late. Climate change will be irreversible. What makes this all the more tragic is that either no one's to blame or we're all to blame and I know in my heart that it is not the case, under present circumstances, that no one is to blame.

- The fact that the environment is not a problem was made clear to me throughout the semester. I favor this selfless outlook on the world. If I turned on a TV, I would most likely see people trying to fix something here, and change something there. But, the world doesn't have an opinion. It will act in an inevitable way. When people think that the environment is a problem they derive a false sense of hope. That is, "maybe we can just change any problems we have and exist without fear."

  Know that the world will continue to change indefinitely, gives me a sort of comfort. Frankly, the theories I have learned are ones concerning nature. Being so, they are easily applied to almost anything concerning natural occurrences. I find that theories are more efficient and predictable than "fixing" the problem. That is, more fear is dispelled by knowing what will happen rather than believing that is will not happen by altering something.

- Something I have learned that has had a strong impact on me is the idea, even truth, that we are just parts of an interconnected system. I am a part of something bigger than the human race; a system of scale free networks that has been working for billions of years and will continue to much after the end of my existence. Down to the mitochondria in my cells, powering away, everything is a part of everything else. Whether or not I contribute significantly to the scab of being left by humans on planet Earth, I can not be sure. I am sure however that I am truly lucky to have witnessed such a complex system of perpetual mystery. I have learned to think of humans as any other species on this planet, with no rights to any of its virtues. As all species I believe we have come and in time will go. This class has been truly

illuminating in the sense that I understand we are just another part of the puzzle. I b believe the earth itself is part of a greater systems and when it dies, which I'm sure it will some day, it will be like any living thing currently inhabiting it majestic outer layer, an input in the universe's fractal nature. These ideas that I learned in Environmental Systems Theories will without a single doubt in my mind have lasting value in my life. I hope you continue to teach this class and that one day it becomes a major. Thank you.

- Honestly, everything in this class has had a huge impact on me. I already knew a bit about systems and how we have created environmental problems. But, this class has further expanded my knowledge in this topic.

  I love how all the complex systems in this world behave similarly. As the r-value increase in every system and as pressure builds up, it becomes more sensitive dependent and more critically (sic). And eventually it avalanches or collapses. At works like the Xnext bifurcation diagram (chaos theory)

  Time Series Diagram, r = ~1.8

  As the r-value increases the population has a harder time to reach equilibrium and it reaches a point where it bifurcates and becomes fractal.

  You do reach a point where it is too unstable and it collapses and the population goes extinct. I find this relationship with each complex systems (sic) very interesting because they all follow the same rule.

  Another topic that really interested me and me an impact is when we talked about all of the environmental problems we face and will face over the next generations. All of these issues that we're facing are going to become very important in the future.

  I was a major in and my concentration is the environment. I am always going to have all the problems that we discussed in this class in my mind. I want to be able to plan cities in a much simpler way, not like the one that did Harrisonburg, that is going to be responsible for our drinking polluted water.

  I really have taken out a lot of this class and will keep it in my mind in the future and will try to do as much as I can to try to help our environmental problems.

- This class from start to finish has done nothing but enlighten me. I honestly knew next to nothing about the environment and certainly knew very little about what sort of problem it was. However, of all the things that I have taken away from this course the one thing that will have the most lasting value to me was the same stuff I discussed in the previous question, lifeboat ethics. I had actually missed receiving the paper before we had the class discussion although from the first question posed that afternoon I was quite intrigued by what I was hearing. Before this class I had never heard of Garret hardin or of his writings and I found it so interesting how such large issues of today's world could have been avoided by following such basic reasoning. Although such reasoning is never simple when it needs to be followed by every nation/state/person to actually work, I remember thinking that I agreed with not simply giving handouts but my next thought was their "teach a man to fish." Yet, as I learned even that has its downfall as we're hearing today with the scarcity of resources in India. As I continued reading/discussion what Hardin was describing I enjoyed the simplicity or cut and dryness of his arguments in that he removed as much biasness as possible and gave only logical statements. Besides that article the one other think I took away of lasting value was the knowledge that sometimes the way we've been taught to see the world isn't always enough. So, I guess the idea of searching for/learning to ask the <u>right</u> questions is something I'll certainly apply in my life for a long time.

- I have learned much from this class. I knew most of the chaos and complexity theory from GGEOL this summer w/Fichter. The currents/NOA material was new and interesting. The section on collapse of societies due to diminished returns as well as lifeboat ethics in general were very interesting and go me thinking about politics in a somewhat new way. Overall a very entertaining class which I looked forward to every week, and am glad I took.

- wow, I don't know where to start! I think the thing that impacted me the most was Garrett Hardin's two models. I think it is incredible how you can relate them to what's going on now with water and immigration. I think now that this type of science is so close to actuality compared to classical and that it's a loss to people everywhere to not be informed about what's happening to our environment and how some believe we are so close to catastrophe. This class I am sure will have a lasting impact on me and has already inspired me to talk about the environment on a regular basis. I actually plan on doing something in the environmental line of work. Hardin's models and this class have solidified my former belief that something needs to be done or we're all in for a sure failure. I also enjoyed learning about what happens to systems with high energy and how they actually display fractal patterns. The computer models of x-next and the boids displayed this high energy and were very fascinating to watch and work with. Overall I really enjoyed the course and hope that in the future people start to think and notice what's actually going on or else !!

- I found it very interesting that early civilizations effected the environment in similar ways to how we effect it. The topic that had the strongest impact however was the collapse of societies, how quickly they collapse, and what made them collapse. It was interesting to learn that we are doing similar things. It is a topic that I would like to learn more about in the future.

  Thank you for a very interesting class!!

- When I walked into this class I thought I was pretty self aware of the environment. Boy was I wrong. I knew that global warming was just a natural cycle. I wasn't aware that we were already at the critical point. I was anticipating more of a gradual change, but this class showed me that we are in immediate danger. As a sensitive dependent system, we are at risk of collapsing very soon. So with that knowledge I'm going to walk out with a new respect for the environment and encourage others to do the same.

- I've always heard on the news and on TV about global warming and economic struggle and all of that stuff, but I always took it as people just exaggerating. It seems that every generation thinks they are the last, but after taking this class I can see why people have been saying it recently. It's very concerning to see how much we are on the brink of civilization collapse. I'm a science fiction nerd and have always just assumed that our species will be around f a long time to come but it hard to believe that now. I started to recycle and have been bugging my parents to do the same. I've always been more conservative with water by taking shorter showers and not leaving the faucet running when brushing my teeth. I also turn off the light when I'm not using them. Although I'm trying to be more environmentally cautious person its hard to believe that what I'm doing can really make that much of a difference.

- this class has opened my eyes to a new perspective on the world. One of the most important things I learned is that, people will do what they want whether or not it is beneficial in the long run. We all may think that we can't do anything about the environment but by thinking in this manner nothing will be done.

  Humans have had a huge impact on the environment in some ways. But, overall the environment is a complex system and it will follow its own course. I believe that humans could be the minute change that could cause an environmental collapse. Because the environment is so critical now, I know from sensitive dependence, any change could cause an avalanche.

  I believe, now, because of this class, that humans have seen a remarkably calm 10,000 years of steady climate and that this inevitably must end.

  Classic science is a great way of dealing with small body problems but only chaos theory and complex systems can truly describe what is happening in all natural systems

  I also believe now that it is better to help by not helping. Humans are intrinsically problem solvers, and this, although it has 'saved' us countless humans, will eventually lead to the collapse of human society. Technology may temporally save us but its increase in complexity will eventually be our down fall. As Tainter point out in his graph.

- this entire class had a very strong impact on myself. This class started slow but it all came together perfectly at the end. I now have a huge interest in environmental systems and how they work and how they are effected and changed. Overall the most lasting impression this class will have on me will be the understanding of how human population has negatively effected the world. At the rate our population is increasing the environment will be unable to support our food, energy, and waste disposal needs. No matter how green we become if there is too many people on the planet.

- This class taught me many important, valuable lessons and take home messages. The most important thing that you could say actually scared me, was that the environment has already begun to drastically change for the wor5se which I was unaware of. I learned that everything effects one another, each living environment causes another organism to change. Right now what's sticking with me is how we wrapped up the class. We saw, through your lecture how everything is effecting one another and it is quite scary what is actually happening out there.

  The most important thing I learned was how soon our water will be running out. That is all I drink is water an coffee. The scarier part was how I learned no one is really doing anything to prevent our water from being polluted. I never knew about all the antibiotics and medicines that are in our water, and no one knows a way get that will filter them out.

  This class has mostly made me aware and becoming aware is the first step in the right direction. I think humans have been altering the environment for so many years and now if we can not fix problems that have to do with the water we drink, what we need for survival, I have learned that our future is not looking very positive.

  Our environment is extremely sensitive dependent, and because of this I again feel the awareness must spread because something so small can have catastrophic negative effects on our world. Sensitive dependence will also have a lasting impressing because you don't always realize how those small little things can really impact the environment greatly.

  Thank you for a great insight into topics that I never knew were actual problems in our world - very interesting class !

- I don't think I can name just one thing that has had a strong impact on me, because the entire class was eye-opening and enlightening. I feel so much less ignorant about the world I live in now. I guess one of the things that has had the strongest impact on me would be how close we are to our world changing completely and its mainly due to human societal development. We've caused so much damage over the past 15,000 years, that all I can do is help spread the word and do my part for the environment. Even though there is really no way of reversing it, I hope the best for future generations. This course has been an amazing experience and has opened my eyes to so many aspect and theories about our world. Thank you granting me this mind-boggling experience.

- learning about complex systems had a great impact on me and my way of thinking. I was fascinated by how these systems behave and that they contradict everything I have learned previously (classical science). Complex systems may be unpredictable at times but it is more realistic to learn of these types of systems. At first the concepts seemed a little 'out there' but by the end of the course they make a lot of sense and that made me ever more interested.

  Since I am a Business major I can easily identify with complex systems in the economic world. I will use what I have learned in this class and use it for future decision making and understanding such complex systems. Thanks.

- The biggest impact this class brought about for me was when I came upon the realization that humanity, or species, would be (perhaps currently is) the cause of the next great extinction event. There will be lasting record of humanity on Earth, and it will be in the fossilized remains of ourselves and all of that of which we brought about the demise.

It is also a curious sense of purpose in that we shall play the integral role in reshaping the environment and reducing the life forms currently present sufficiently that new environments and new life forms will have the opportunity to arise. We shall bring about the next evolutionary wave, via the destruction of the current one.

I feel like a supervillian. I suppose it is all rather morbid. So, thanks for that.