

## **CURRICULUM COMMITTEE REPORT**

**The Curriculum Committee recommends the following courses to the Graduate Board for approval at its September 21st, 2017 meeting.**

*New Courses:*

ECO 516 Evolutionary Economics



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GRADUATE SCHOOLS

# NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

Graduate course proposals, modifications, or eliminations must be submitted to the Graduate School no later than the 3rd of each month. Please refer to the Graduate School website for the Curriculum Committee meetings schedule. Electronic signatures and submission is required.

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to [erin.twitcheil@maine.edu](mailto:erin.twitcheil@maine.edu). Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT School of Economics  
COURSE DESIGNATOR ECO COURSE NUMBER 516 EFFECTIVE SEMESTER Fall 2017  
COURSE TITLE Evolutionary Economics

## REQUESTED ACTION

**NEW COURSE** (check all that apply, complete Section 1, and submit a complete syllabus):

- ☒ New Course  
☐ New Course with Electronic Learning  
☐ Experimental

**MODIFICATION** (Check all that apply and complete Section 2):

- ☐ Designator Change ☐ Description Change ☒ Cross Listing (must be at least 400-level)<sup>1</sup>  
☐ Number Change ☐ Prerequisite Change ☐ Other (specify) \_\_\_\_\_  
☐ Title Change ☐ Credit Change

## ELIMINATION:

- ☐ Course Elimination

## ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

**Leader, Initiating Department/Unit(s)**

*M. C. P.*

1.27.17

**College(s) Curriculum Committee Chair(s)** (if applicable)

*Frank C. [Signature]*

8-2-17

**College Dean(s)**

**Graduate School** [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

**SECTION 1 (FOR NEW COURSE PROPOSALS)**

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

ECO 516: Evolutionary Economics is rigorous exploration of the dynamics of human economies and their social underpinnings, giving students the ability to use economic logic far beyond its usual confines. Students will learn how (and how not) to apply the Darwinian model of adaptive evolution (variation, selection and transmission) to market evolution, as well as human culture, behavior, and institutional change. The course also integrates new literature on the evolution of cooperation and multilevel selection to provide a solid mechanistic model of the dynamics of institutions, economies and societies. The course covers historical and current evolutionary approaches to economics and students will learn how an evolutionary approach connects to the other social sciences. We study emergence of social and economics adaptations of individuals, governments, corporations and other organizations. Students build evolutionary accounts of economic systems, characterize evolutionary forces acting in economic systems, suggest interventions to improve outcomes. Students complete a major project on an evolving economic system of their choosing. Students will be introduced to the analytical tools of evolutionary game theory and agent-based modeling. ECO 416 and 516 cannot both be taken for credit. 3 credits. Prerequisites: Instructor Permission.

Components (type of course/used by Student Records for MaineStreet) – Multiple selections are possible for courses with multiple non-graded components:

- ☐ Applied Music      ☐ Clinical      ☐ Field Experience/Internship      ☐ Research      ☐ Studio  
☐ Laboratory      ☒ Lecture/Seminar      ☐ Recitation      ☐ Independent Study      ☐ Thesis

Text(s) planned for use:

(1) Hodgson, G. M., & Knudsen, T. (2010). Darwin's Conjecture: The Search for General Principles of Social and Economic Evolution. Chicago: London: University Of Chicago Press. (2) Frank, R. H. (2012). The Darwin Economy: Liberty, Competition, and the Common Good. Princeton N.J.: Princeton University Press.

Course Instructor (include name, position, teaching load):

Timothy M. Waring, Associate Professor of Social Ecological Systems Modeling, 2 courses per year.

Reason for new course:

Interdisciplinary social science courses are rare at both undergraduate and graduate levels. Evolutionary Economics fills this gap by offering a rigorous exploration of the social and economic dynamics that give rise to social patterns in any society, with a focus on the co-evolution between institutions and behavior.

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

- ☒ No. The department will not request additional resources for this course.  
☐ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

There are no other evolutionary social science courses offered in the University, which underscores the unique opportunity of offering a graduate course of this type. Students from psychology, anthropology, the natural sciences and other fields may be interested to take the course.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

The course will be offered through the college as a regular NSFA course. The course will be offered on an alternating year basis.

# Evolutionary Economics (ECO 416/516)

## DATE & TIME

**Instructor:** Tim Waring ([timothy.waring@maine.edu](mailto:timothy.waring@maine.edu))  
**Website:** Google Classroom (use [maine.edu](http://maine.edu) account, code: XXXXXX)  
**Office:** Winslow Hall, Suite 200  
**Office Hours:** Mon 4-5pm or by appointment  
**Prerequisites:** 416: ECO 120, 121 & sophomore standing or instructor permission  
516: Instructor permission

## Course Overview

Evolutionary economics takes advantage of the science on the evolution of the human species, human behavior, and human institutions. Evolutionary economics applies the principles of variation, selection and retention to understand the dynamic nature of economic systems, filling some gaps in economics and other social sciences. This course will cover historical evolutionary perspectives on economics and current evolutionary research in the economics and the social sciences. Student will be introduced to the analytical tools of evolutionary game theory and agent-based modeling. Students will practice building evolutionary accounts of economic systems, characterizing evolutionary forces acting in economic systems, and suggesting evolutionary interventions to improve outcomes, and will complete a major project on a system of their choosing. *This class is appropriate for students outside of economics as well as economics majors. There are no prerequisites. 3 credit hours.*

## Learning Objectives: Upon completion, this course students will be able to:

- detail the requirements for evolution by natural selection
- list the features distinguishing cultural from genetic evolution
- identify sources of variation, selection and transmission in economic systems
- develop an evolutionary accounting of an economic system of your choice
- identify and avoid evolutionary (and economic) storytelling
- estimate the dominant level of selection in your economic system
- diagnose economic systems, and prescribe evolutionary interventions
- explore agent-based models and evolutionary game theory as analytical tools
- detail the benefits of an evolutionary accounting of economic phenomena
- develop clear, logical, persuasive evidence based arguments in your written work

## Course Materials

- Hodgson, G. M., & Knudsen, T. (2010). *Darwin's Conjecture: The Search for General Principles of Social and Economic Evolution*. Chicago; London: University of Chicago Press.
- Frank, R. H. (2012). *The Darwin Economy: Liberty, Competition, and the Common Good*. Princeton N.J.: Princeton University Press.

- **Journal Articles** - I will assign readings from the peer reviewed scientific literature. You will be responsible for accessing these articles using our truly amazing online library resources.

## Assignments

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### 0% Participation

is required and expected of professional students such as yourselves. All term.

### 40% Evolutionary Economic Analysis (a term paper)

You will describe an economic system in evolutionary terms, diagnose it using evolutionary concepts, and use that understanding to suggest novel interventions. It will include a final paper (~10p single spaced) as well build up exercises. Proposal 5%, Outline 10%, Final 25%.

### 20% (416 only) Class Communication Project

As an entire class, you will be faced with the difficult challenge of explaining the concepts of evolutionary economics to two visiting non-specialists, one evolutionary biologist and one resource economist. This challenge is great, and it will require the efforts of the entire class. The non-specialists will judge how well you convinced them of the utility of the evolutionary approach.

### 20% (516 only) Peer Review Analysis

In preparation for your own evolutionary analysis, you will read, study and critique an evolutionary economic research paper of your choice.

### 15% Précis (3)

Expert summaries of the one of our weekly readings

### 15% Practices (3)

Short papers to practice describing economic systems in evolutionary terms.

### 10% Methods Homework

Modeling exercises using agent based modeling software NetLogo.

## Grading Rubrics

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See attached grading rubrics document.

## Expectations and Guidelines

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*As college students, I expect to be able to treat you as adults, with all the independence, commitment and responsibility that status entails. Below are some of my expectations for you, as a professional student.*

**Attendance** - please plan to attend all classes, on time or early.

**Deadlines** - have all assignments submitted by the deadline. I don't have time for late work.

**Participation** - read the readings, participate in discussions.

**Devices** - silence and ignore your cellphones, no laptops are allowed unless requested

**Originality** - promise that all submitted work is entirely your own.

**Respect** - treat fellow students and the teacher with respect. **HELP EACH OTHER OUT.**

### **Class Format**

*Discussion will be central part of the class.* This class is small enough to facilitate very in-depth discussion of the material. I will be able to tell immediately if you have not read the readings for the day. But, I have kept the daily readings to a minimum, literally. There is only one each class day. However, I will also use many other ways of engaging the concepts and skills. It will be lively, I can guarantee it!

### **Important Dates**

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<u>Last Day to...</u>	<u>Date</u>
add classes	Fri-4-Sep
drop classes	Sun-13-Sep
transcript drop	Thu-1-Oct
drop without 'F'	Fri-13-Nov

### **Academic honesty:**

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

### **Students with disabilities:**

If you have a disability for which you may be requesting an accommodation, please contact Disabilities Services, 121 East Annex, 581-2319, as early as possible in the term.

### **Course schedule disclaimer (disruption clause):**

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

### **Sexual violence policy:**

**Sexual discrimination reporting:** The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell any of your teachers about sexual discrimination involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

Behaviors that can be "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

#### **Why do teachers have to report sexual discrimination?**

The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise— for example, if more than one victim reports having been assaulted or harassed by the same individual.

#### **What will happen to a student if a teacher reports?**

An employee from the Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution's obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution's ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution's response.

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

**If you want to talk in confidence** to someone about an experience of sexual discrimination, please contact these resources: For *confidential resources on campus*: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000**. For *confidential resources off campus*: **Rape Response Services: 1-800-310-0000** or **Spruce Run: 1-800-863-9909**. **Other resources**: The resources listed below can offer support but may have to report the incident to others who can help: For *support services on campus*: **Office of Sexual Assault & Violence Prevention: 207-581-1406**, **Office of Community Standards: 207-581-1409**, **University of Maine Police: 207-581-4040 or 911**. Or see the OSAVP website for a complete list of services at <http://www.umaine.edu/osavp/>

## Grading Rubrics

### Evolutionary Economics

### ECO 416 & ECO 516

*Note – This combined graduate & undergraduate course is intentionally constructed in parallel, for an important pedagogical reason: neither undergraduates nor graduate students will be familiar with the content and skills of evolutionary economics. As a result, the majority of assignments for both graduate and undergraduates are the same, but the instructor will hold the graduate students to a higher standard for evaluation for writing, analysis, logical completeness, and literature research. The two exceptions to this are the term paper, which is longer and requires more literature review and the class project, in which the graduate students must take a leadership and organizational role.*

#### Assignment Differentiations

<u>value</u>	<u>assignment</u>	<u>differentiation</u>
0%	Participation	none
40%	Term paper work	quality of written
20%	Class Project	graduates lead
15%	Précis	none
15%	Practices	none
10%	Methods Homework	none



## Evolutionary Economics Précis

### \*\*\* INSTRUCTIONS \*\*\*

- 1 - Edit this document.
- 2 - Add your last name to the Filename, so it reads: to "Précis 1 - Lastname"
- 3 - Delete these instructions (obviously).

### How to write a précis

A précis is an expert summary. Look it up. You will write précis of the articles or book chapters assigned. These are due by 5:00pm Fridays unless otherwise specified. Each précis should be at least one page in length (single-spaced, 12-pt Times New Roman). All sources used should be properly cited according to the Harvard Citation Style. I also recommend Zotero ([www.zotero.org](http://www.zotero.org)) or similar tools.

Both précis and practice analyses are graded on a 0-3 scale. A 3 means that you went above and beyond expectations, a 2 means that your work was good and met expectations, a 1 means that you handed something in, but you are either not grasping the concepts or are not putting forth an acceptable level of effort. If you do not hand in your précis on time, your grade for the assignment will be a 0.

### Steps to preparing your précis each week:

1. Find the article using the awesome library resources
2. Write a detailed expert summary of the article
3. Comment on the relationship to other concepts or readings, add your own opinion
4. Create an appropriately formatted citation at the top
5. Compose and submit the Google Doc in Classroom by 5:00pm Friday
6. Be ready to talk about your work in class

Firstname Lastname

### Citation:

[Waring, T. M., M. Ann Kline, J. S. Brooks, S. H. Goff, J. Gowdy, M. A. Janssen, P. E. Smaldino and J. Jacquet. 2015. A multilevel evolutionary framework for sustainability analysis. *Ecology and Society* 20 (2): 34.]

Commented [1]: Add the citation here.

### Précis:

goes here

## Evolutionary Economics Practice Assignment

### Instructions (keep while writing, delete before turning in)

Use population thinking, Tinbergen's four questions, and the three Darwinian principles to create a detailed description of a single a \*specific\* economically-relevant cultural trait. This might be a particular business practice, social norm, production routine, governance arrangement, organizational role, or other economically relevant cultural trait of your choosing. Practice analyses are graded on a 0-3 scale. A 3 means above expectations, a 2 means good work, a 1 means that you handed something in, and a 0 means you didn't.

Commented [2]: Practice analyses are graded on a 0-3 scale. A 3 means that you went above and beyond expectations, a 2 means that your work was good and met expectations, a 1 means that you handed something in, but you are either not grasping the concepts or are not putting forth an acceptable level of effort. If you do not hand in your piece on time, your grade for the assignment will be a 0.

For this analysis you will increase your specificity and clarity.

### 1. Trait Description - 1p

- a. Describe the relevant population (keep in mind the life cycle of the 'individual')
- b. Describe how the trait functions. Also list the relevant alternative traits in the same population (e.g. serving drive-through fast-food without napkins vs with).

Commented [3]: this means paragraph

Commented [4]: may be a worker or a business or an NGO, or a government, for example.

### 2. Darwinian Principles - 3p

- a. **Variation and sources of variation** - How is variation in the trait currently distributed? Where does new variation come from, and how? From errors? From a constant flow of new innovations? From migration from another culture?
- b. **Transmission patterns and modes** - How does the trait spread? Is it transmitted through subconscious imitation, or by intentional copying, or industrial espionage and reverse engineering? Does it spread between peer individuals or organizations or in some other way, from say high-status individuals to low status.
- c. **Selection mechanisms** - What forces act to reduce variation? How do they work? What is the result? What might be a long-run consequence? What about adaptation?

### 3. Tinbergen's Four Questions - 4p

- a. **Mechanism (Causation)** - How is the behaviour triggered? What cues or circumstances are required and what pathways (cognitive or organizational) within the individual are involved?
- b. **Development (Ontogeny)** - How does the behaviour change with age, experience and environment?
- c. **Evolution (Phylogeny)** - How did evolution in earlier generations contribute to the current behaviour?
- d. **Function (Adaptation)** - How does this behaviour help the organism/species survive?

**4. Adaptation - the big questions - 1p**

- a. Is the trait you describe an adaptation?
- b. Is it under positive selection?
- c. Do you predict it will persist?

**Full Name**

**An evolutionary analysis of trait**

- use 1.15 spacing (like this text)
- MIN 1 page
- MAX 2 pages
- 1 paragraph per major analysis point
- Please add a simple reference section for the few references you draw on

## Interdisciplinary Communication Challenge

### Class Report

*Graduate students will help to lead the class communication project. They will be responsible for the team organization, and submit the written report. This added responsibility falls to the graduate students, however, the work of the class project itself is shared equally among graduate and undergraduate students in each team.*

Recall your plan to improve from last time. (GRADUATE STUDENT can share the report from last time with the class). It includes a plan to:

- Address each of the knowledge gaps you identified.
- Improve on each miscommunication issues that arose.

Revisit and improve on that plan.

### Week Schedule

**Mon, Nov-30 - Dr. Michael Lang - Historian**

**Wed, Dec-2 - Dr. Brian Olsen - Biologist & Dr. Keith Evans - Economist**

**Fri, Dec-4 - Group report writing in class - Class report DUE 5pm**

Monday and Wednesday will proceed as follows:

- 50% of the class will present.
  - Make a 15 minute slideshow, make it good.
  - Spread the presentation out among the group.
  - **Tlp:** Define your terms, build from simple principles to larger theories.
- The Interlocutor will then question the class (as a whole), and a discussion will ensue
- Take copious notes (you'll need them)

<u>Monday presenters:</u>	<u>Wednesday presenters:</u>
1. ...	1. ...
2. ...	2. ...
3. ...	3. ...
4. ...	4. ...
5. ...	5. ...
6.	6.

**Presentation Outline**

Create a presentation to back up your points. The points matter most. But the slideshow should be used to help, to illustrate, to clarify, etc. Below is a suggested outline, from which you may deviate. Consider it a guide.

1. What is evolutionary economics?
  - o What are its fundamental components?
  - o What questions it is useful in addressing?
  - o What types of answers does it provide?
2. What is the value of an evolutionary approach to economic study?
  - o What social processes does it add to the topics of traditional economics?
  - o What new policy considerations does it lead to?
  - o How does it connect with other disciplines?
3. Use examples from your own case studies throughout, to illustrate your points.

***Friday***, complete the report below as a class, and turn it in at 5pm. Compose a shared Google Doc in class on Friday, and edit it in teams.

**Report Structure**

*Keep these questions as headings. Write 1-2 paragraphs per bullet point, as needed. Single spaced, 12pt font, 5+ pages.*

**Summarize the conversations for each day.**

- What did issues the interlocutors challenge the class on? Explain the issue they raised in each case.
- What understanding gaps did the interlocutor reveal in the class?
- What understanding gaps did the interlocutor display?
- Were there any persistent mis-communication issues?

**A summary reflection**

- What successes did the class have explaining evolutionary economics and its value?
- In what ways were you more successful than last time?
- In what ways could you improve still? Note any additional lessons learned.
- What doubts do you have about the utility of an evolutionary approach?

### My request to your interlocutors

Dear Michael, Keith and Brian,

Thank you for agreeing to serve as interlocutors for ECO 370 - Evolutionary Economics. The class will proceed as follows, much like the prior time. First, the students will present to you what evolutionary economics IS, then explain why evolutionary economics has VALUE. Half (6) of them will present either day. The two groups are tasked with explaining the nature and value of an evolutionary approach on their own, with very little direct guidance. In a sense, this is something of a final-term exam for them.

#### ECO 370 - Evolutionary Economics

200 Winslow Hall, 3:10pm - 4pm

Mon, Nov-30 - Dr. Michael Lang - Historian

Wed, Dec-2 - Dr. Brian Olsen - Biologist & Dr. Keith Evans - Economist

Fri, Dec-4 - Group report writing in class - Class report DUE 5pm

Your goal as interlocutor is to challenge the students in a few key dimensions: 1) in their conceptions and understanding of evolutionary economics, 2) in their appreciation for the differences between disciplines, and 3) on what you may see as weak points in evolutionary economics, and 4) in general toward higher levels of logical thinking.

Take notes (for yourself) on the presentation (~ 15 min), and develop (on the fly) questions, feedback and challenges to raise afterwards. Please aim for the biggest and hardest challenges first, because time is limited.

#### Afterward, please send an individual email with:

- 1 - Thoughts about the weaknesses and strengths of the class in terms of conceptual understanding and preparedness.
- 2 - A presentation grade, between 0 (terrible) and 10 (outstanding), with 5 being 5 UMaine undergraduate average.
- 3 - The names of students who did particularly well in the discussion phase.
- 3 - An overall grade for the group presentation. (same scale)

At the end of the week, after your visits, the class will collectively assemble their thoughts for me as one large group assignment. I will compare your evaluations with theirs to find out how well they truly did.

Let me know if you need anything.

Tim

## Evolutionary Case Study Analysis Proposal & first outline

This outline is the first in a series of three assignments designed to lead the way toward an excellent evolutionary and economic case study. This outline will lay the foundation for everything that follows, and will require good amount of time.

*Case studies are an important and overlooked type of research. They lay the foundation for scientific discovery in any field. In a case study a researcher combines everything that is known about a particular case with as much new data from as many angles as possible to construct a complete picture of a particular situation, actors, and context. Here you will follow the same spirit: seek to describe a particular situation completely by collecting a broad and deep set of knowledge on the topic from many different sources.*

- *Build your case study around a cultural trait of economic relevance.*
- *Focus the cultural evolution of that economic trait.*

### Macroevolution

Microevolution is the study of the spread (or failure) of a very specific trait in a particular population at a particular time. We have mostly been studying microevolution.

Macroevolution is the long term history of cumulative adaptation in a particular domain.

For example this might be the evolution of organized teaching institutions, the evolution of smoking technology, the evolution of music consumption, the evolution of payment for work, the evolution of slavery as part of labor practices. You will include a section on the macroevolution that will feature the long term history of the practice/institution, or tradition, and how it has changed, and why it has changed over recorded history.

### Outline format

Create an outline at least 3 pages, single spaced, in length. Use hierarchical bullet points as I have here. Keep the title headings for each section, and add whitespace to make it readable. Cite your sources.

*The point here is to build your argument about adaptation, selection, levels of selection, and cumulative change over time. Do not include full paragraphs (except where requested). DO include citations to your information sources as frequently as possible.*

## An evolutionary case study of \_\_\_\_\_ Outline

Commented [5]: fill this in and delete the pages above.

Microevolution of \_\_\_\_\_ (...narrowly defined trait)

Commented [6]: fill this in.

### Trait and Population - 4 points

1. **Define** the trait. Limit the definition of the trait so that it has only one dimension. To do this, make the trait dichotomous (examples: vaping, not vaping; owning slaves, not owning slaves; using peer to peer networks to share music illegally, or not doing so) or continuous (e.g. frequency of worker payment from yearly to daily). Limit the scope of your analysis (e.g. smoking habits in the USA since 2000). (paragraph needed here)
2. **Name** the population(s) of entities that might hold the trait. (workers, firms, governments, NGOs, waiters, investment bankers, etc).
3. **List** all the ways individuals enter and exit the population. Also list the relevant 'life cycle stages' of the 'individual' (be it a person or a corporation).
4. **Draw** a life cycle diagram for the population of entities. Then add to it the trait transmission pathways. Only include diagrams that you have made.

### Darwinian Principles - 6 points

#### 5. Variation -

- o **Make a table** of the few trait variants you have defined (keep in mind your dichotomous or 1 dimensional continuous definition above). For example:

Pay Frequency	Job type	category	other category
daily	hourly	answer one	...
weekly	hourly	different answer	
bi-weekly	hourly	...	
monthly	salaried		

- o **List** ways in which that variation is distributed (spatially, politically, demographically). Be specific.
  - o **List** sources of new variation. Be specific.
6. **Transmission** -
- o **List** all the most important ways the trait spreads (at least two).
7. **Selection** -
- o **List** forces of selection (at least two). Explain each selection process in detail. Who selects? (is it a person or 'the environment') How does selection happen



(conformity, success-biased, random), and when (refer to life cycle diagram), etc. (paragraphs okay, but provide evidence - cite sources)

#### 8. Adaptation -

- o State your conclusion regarding adaptation. Is this trait an adaptation? If so, for what entity? If not, state that. (You will explain this in more detail in future versions).

### Macroevolution of \_\_\_\_\_ (... broadly defined tradition/institution) - 3 pts

#### History - 4 points

9. Define the a more broad and inclusive tradition for this section. (paragraph okay, cite sources)
10. List the major changes in long history of the broadly defined trait. (See the case studies in the CMLS framework paper for examples). Document any historical change in trait distributions, individual and organizational populations, and selection regimes.
11. Include a historical plot to show a trend over time (if possible). Only include plots that are perfectly relevant such as plots of your trait over time. Include a caption as seen in the example below. Citing the source in the caption.

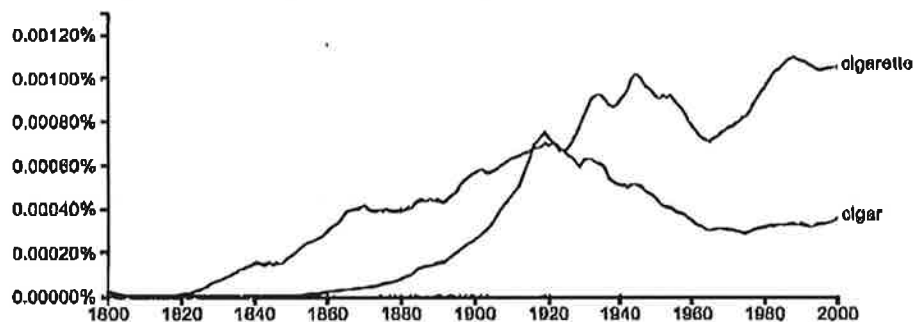


Figure 1. Frequency of the words cigar and cigarette in the English corpus shows a decline in the popularity of the term cigar since 1920, and the rise of the cigarette in that same time. Plot generated from Google Ngram dataset on the English Corpus, from 1800 to 2000 with a smoothing of 3.

Commented [7]: This might be a useful source for some of you.

<https://books.google.com/ngrams>

Also, be sure to CITE the source of the information in your references section.

#### Levels of Selection - 5 points

12. List each relevant organizational level that could be a level of selection.
13. Is there a social dilemma involved between any two levels? Provide justification.

14. **Make a table** to show how trait selection operates through the influence of competition, migration, initiation, and demographic change at each level you identify. Show the direction of selection for (+) or against (-) this trait at each level. Consider the CMLS framework paper diagrams as a possible template.
15. **State your hypothesis** about the which is dominant level of selection. Provide evidence.
16. **State your hypothesis** about any changes in the dominant level of selection over time. There may be none, but if so, you should still state that.

**Reference Section - 10 pts**

Collect at least 5 high-quality references and sources to inform your analysis. For the final you will need at least 10. Sources may include peer reviewed scientific journal articles (of the type we have been reading in class), books, newspapers, government or technical reports, and other detailed, high quality information sources.

17. Create an entry for each reference in your reference section. (5 pts)
18. Follow each entry with an indented paragraph explaining the value of the source material for your purposes. (5 pts) 3 sentences max. Add white space between entries:

Duflo, E., Dupas, P., Kremer, M., & Sinei, S. (2006). Education and HIV/AIDS Prevention: Evidence from a Randomized Evaluation in Western Kenya (SSRN Scholarly Paper No. ID 935173). Rochester, NY: *Social Science Research Network*,

This paper provides evidence that the cultural trait of condom use has the greatest impact on the spread of the disease. This is why I estimate that selection for condom use will be greater in the long run than other methods.

## Case Study Outline Version 2

This outline is the second of three assignments that will culminate in an evolutionary case study of an economic trait. The focus of this assignment is higher quality conceptual work, higher quality citations, better rule following, and harder thinking overall. Your goal is to draw the final insights from your analysis. What does your case study tell you? What can you conclude?

### Outline Format

Use the Google Docs formatting of this document. Use hierarchical bullet points as I have here. Keep the title headings for each section. The improved outline should:

- be single spaced
- be 5+ pages long
- have a thesis
- have conclusion which restates the thesis
- have no paragraphs (except where requested).
- have no instruction text, but
- retain the section headings
- cite sources as often as possible to support your arguments
- have a reference section with 10+ high quality references
  - (journal articles, government data, news sources)
  - formatted according to the Harvard Author-date format (Waring, 2012)
  - Use [citethisforme.com](http://citethisforme.com), Zotero, Mendeley, or do it by hand.
  - cite each meticulously.

### But First:

- Reread the CMLS framework paper, especially the case studies at the very end.
- Read an article of your choosing from [economics.com](http://economics.com)
- Read the wikipedia definition of evolutionary economics.
- Reread your last outline and my comments, improve on everything
- Ask yourself what is lacking from your understanding, and go get it.

## An evolutionary case study of your trait here outline v2

### Thesis - 2

- A paragraph which describes what you have found from your evolutionary analysis. What did you learn? You might do this by asking a question and answering it. Some questions to build from are: Is your trait an adaptation? If so, for whom? Why did your trait evolve? By what mechanism? A thesis can be stated in a single sentence, and a thesis paragraph be short - just supporting the thesis, nothing more. **Write your thesis sentence in bold.**
  - no citations here

### Evolutionary Economics

- **Define evolutionary economics - 2**
  - Define evolutionary economics. (paragraph)
  - use citations (H&K, Frank, other readings, are okay)
- **Explain its benefits - 2**
  - Explain some of its benefits and foci. (paragraph)
  - use citations (H&K, Frank, other readings, are okay)

### Trait

- **Define the trait - 1**
  - Limit the definition of the trait so that it has only one dimension. To do this, make the trait dichotomous (examples: vaping, not vaping; owning slaves, not owning slaves; using peer to peer networks to share music illegally, or not doing so) or continuous (e.g. frequency of worker payment from yearly to daily). Limit the scope of your analysis (e.g. smoking habits in the USA since 2000). (paragraph)
- **Population - 1**
  - Define the population of entities that might hold the trait. Defining arbitrary limits to the population is okay too if it makes your analysis easier. List ways individuals enter and exit the population. Also list the relevant 'life cycle stages' of the 'individual' (be it a person or a corporation).

### Darwinian Principles

- **Darwinian adaptation - 2**
  - Explain in one or two sentences how Darwinian adaptation occurs, and how it involves variation, selection, and transmission to produce adaptation. *Keep in mind adaptation is not the explanation for everything.*
- **Variation - 2**
  - List the most common or important trait variants, specifically.
  - Mention ways variation is distributed.
  - List sources of new variation. Be specific.
- **Transmission - 1**
  - List all the most important ways the trait spreads (at least two).

- **Selection - 1**

- **Decision making forces:** Who selects? (is it a person or organization?) How does selection happen (conformity, success-biased, random), and when, etc.
- **Natural selection:** when the environment 'selects' by producing different types of feedback for those with different traits. List forces of selection (at least two).  
Explain each selection process in detail.

- **Adaptation - 2**

- State your conclusion regarding adaptation. Is this trait an adaptation? If so, for what entity? Explain in detail why you come to the conclusion you do about adaptation. How does this trait count as a Darwinian adaptation in the population? Remember, smoking can be a Darwinian cultural adaptation even though it kills you earlier. I want a very clear, well reasoned explanation here. (paragraph)

### Levels of Selection

- **Levels of selection - 2**

- To build this table, do the following first:
- List the organizational levels most likely to be relevant. Define each level. Justify why each level might be a level of selection. Do not include that text.
- Alter the table below to suit your case.

Representative Entity of Level	Best trait for entities at level	Direction of selection for trait	Strength of selection
individual consumer		-	strong
state government		+	medium
national government		+	weak
international coalition		+	weak

- **Social Dilemma - 1**

- Is there a social dilemma involved between individuals at any level? Support your case with evidence. A + at a higher level and - below indicates a social dilemma, of course.

- **Dominant level of selection - 2**

- State your conclusion regarding the dominant level of selection. Support your case with evidence. Why is this reasonable. What does it mean? (paragraph)

### History

- **Broader trait definition - 1**

- Define the a more broad and inclusive tradition for this section.

- **Timeline - 1**

- List the major changes in the longer history of the more broadly defined trait. (See the case studies in the CMI.S framework paper for examples). Document any historical change in trait distributions, individual and organizational populations,

and selection regimes. I would like at least 3-5 historical changes that may be relevant. (cite sources)

- make a bullet for each change with a year and description
- 1750 - Meiji restoration - description with citation
- 1840s - industrial intensification - description with citation
- do not include any tables or plots from other sources
- **Changes to the level of selection - 2**
  - State your conclusion regarding any changes in the dominant level of selection over time. There may be none, but if so, you should still state that. Support your case with evidence. Why is this reasonable. What does it mean? (paragraph)

#### **Conclusion - 2**

- A paragraph which restates your thesis. Your whole paper should support your thesis, and now you will make the point again, in closing. One full paragraph, no citations.

#### **Reference Section - 10 + 2**

Collect at least 10 high-quality references and sources to inform your analysis. Sources may include peer reviewed scientific journal articles (of the type we have been reading in class), books, newspapers, government or technical reports, and other detailed, high quality information sources. Use Harvard author-date format

- for in-text citations (Waring, 2015)
- and their corresponding reference section entries:

Duflo, E., Dupas, P., Kromor, M., & Sinci, S. (2006). Education and HIV/AIDS Prevention: Evidence from a Randomized Evaluation in Western Kenya (SSRN Scholarly Paper No. ID 935173). Rochester, NY: *Social Science Research Network*.

## Evolutionary Case Study (*final*)

Make an argument.  
Take a stand.  
Propose a hypothesis.  
Present evidence.

Finally, you can write the complete evolutionary case study you have been collecting pieces for. The focus of this assignment is your demonstrated mastery of the concepts of evolutionary economics, and your clarity of thought and writing. High quality references and appropriate citation formatting is also key. You must answer the question: *What is evolving, and how?*

And you must support your answer with evidence documented with citations. You will use everything that you have developed so far for this case study, but reorganize it so that it creates a single narrative.

### Research Paper Format

Use the Google Docs formatting below. Use the section headings I have provided you.

The research paper should:

- be single spaced
- be 5+ pages long (grad students: 8+ pages)
- have a thesis
- have conclusion which restates the thesis
- be entirely constructed of paragraphs
- cite sources as often as possible to support your arguments
- use historical charts or other graphical data to support your argument
  - but cite it responsibly
  - graphs and charts will not be counted toward your page length.
- have a reference section with 10+ high quality references (grad students: 10+ peer reviewed articles, 15+ high quality references)
  - (journal articles, government data, news sources)
  - formatted according to the Harvard Author-date format (Waring, 2012)
  - Use [citethisforme.com](http://citethisforme.com), Zotero, Mendeley, or do it by hand.
  - cite each meticulously.

### These things will actually help you:

- Read or reread:
  - The CMLS framework paper, guiding questions and case studies.
  - Something from [evonomics.com](http://evonomics.com)
  - Wikipedia definition of evolutionary economics.
  - Your last outline and my comments
- Ask yourself what is lacking from your understanding, and go get it.
  - Repeat

**An evolutionary case study of your trait**  
student name  
*length guidelines for undergraduates*

**Abstract - 1 paragraph exactly**

- A summary of your entire argument, from context to evidence to conclusion. This should contain no references and be written after every other section is complete.

**Introduction - 1+ page**

- Describe the domain you are studying precisely (define the trait, the population, the benefits and costs, how it tends to vary, be transmitted and be selected).

**Evolutionary Economics - 3+ paragraphs**

- Define evolutionary economics, and explain its conceptual foundations. Be simple, be accurate. Cite H&K, or others.
- Explain the value of an evolutionary approach.
- Next explain that you will base your analysis on this evolutionary framework, and explain why it makes sense to do so in this case.

**Evidence of Evolutionary Patterns - 2+ pages**

- Make an argument. Take a stand. Propose a hypothesis about how your system is evolving. Present evidence you have collected about that hypothesis. First pick a good question, one that fits your study. For example: is the trait an adaptation, and if so for whom? Or how is this trait influenced by the various levels of selection? And develop *Frame your question question as an hypothesis in the context of your case study.*
- Present your approach to answering this hypothesis by describing the types of evidence that are relevant, and what they would mean.
- Present the evidence that you have collected, with one paragraph for each type of evidence.

**Conclusion - 1 paragraph exactly**

- State your conclusion regarding your hypothesis
- Summarize your evidence and logical reasons for it.

**Discussion - 1+ page**

- Up until now everything you have written is based on your research. Here, you should go beyond what you have evidence for and think about the implications of your findings for the broader world. What does it mean? How should build policy based on what you've found? How should we regulate markets? How should we tax behaviors? etc. Think outside the box, but base that thinking directly on your case study.

**References - 10 + sources**

- Collect at least 10 high-quality references and sources to inform your analysis. Sources may include peer reviewed scientific journal articles (of the type we have been reading in



class), books, newspapers, government or technical reports, and other detailed, high quality information sources. Use Harvard author-date format. Example below.

#### References

Boyd, R. & Richerson, P.J., 1992. Punishment allows the evolution of cooperation (or anything else) in sizable groups. *Ethology and sociobiology*, 13(3), pp.171–195.

Bulte, E. & Horan, R.D., 2010. Identities in the commons: The dynamics of norms and social capital. *The BE Journal of Economic Analysis & Policy*, 10(1). Available at: <http://www.degruyter.com.proxy4.ursus.maine.edu/view/j/bejeap.2010.10.1/bejeap.2010.10.1.2372/bejeap.2010.10.1.2372.xml> [Accessed June 15, 2013].

Commented [8]: REMOVE URLs for all sources for which they are redundant. All I want is the title, journal, issue, volume, pages.

Cioffi-Revilla, C., 2002. Invariance and universality in social agent-based simulations. *Proceedings of the National Academy of Sciences*, 99(90003), pp.7314–7316.

DoD, 2014. *2014 Climate Change Adaptation Roadmap*, Available at: <https://www.scribd.com/doc/242845848/Read-DoD-report-2014-Climate-Change-Adaptation-Roadmap> [Accessed May 15, 2015].

Commented [9]: URL here because there was no other reference information.

García, J. & van den Bergh, J.C.J.M., 2011. Evolution of parochial altruism by multilevel selection. *Evolution and Human Behavior*, 32(4), pp.277–287.

Gintis, H., 2007. The evolution of private property. *Journal of Economic Behavior & Organization*, 64(1), pp.1–16.

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Hammond, R.A. & Axelrod, R., 2006. The Evolution of Ethnocentrism. *Journal of Conflict Resolution*, 50(6), pp.926–936.

Killingback, T., Bieri, J. & Flatt, T., 2006. Evolution in group-structured populations can resolve the tragedy of the commons. *Proceedings of the Royal Society B: Biological Sciences*, 273(1593), pp.1477–1481.

Moffett, M.W., 2013. Human Identity and the Evolution of Societies. *Human Nature*, 24(3), pp.219–267.

Commented [11]: MOST of your references should be from journals, such as we see here.