Syllabus
Human Nature and Technology B

Course description:
What are humans, how did we get here, and why are there so many of us? What did we inherit from nature, what did we build ourselves, and what are we going to do with it? Is the future in our hands or our tools? Whose future is it, anyway?

This course will look at the history, present, and future of humanity from a broadly philosophical perspective. We will develop a clear understanding of the evolution and history of humanity, of the nature of complex organizations at all scales, and of the role our tools (especially the internet) might play in building our future. The course will cover a number of advanced readings on a wide range of topics, and students are encouraged to focus these discussions to their specific interests. Topics will include the evolution and history of Homo sapiens, cognitive science and the extended mind, the organization of complex systems, information, control, and network theory, machine learning and artificial intelligence, synthetic life and biological autonomy, internet culture and memetics, and many other topics.

Books:
- Kevin Kelly (2011) What Technology Wants

Expectations:
- Students are expected to put in their best efforts in all assignments and activities.
- Students are expected to treat their classmates, instructors and CTY staff, and all of the the Princeton community and facilities with the respect and care they deserve.
- Students are expected to defend their beliefs passionately, to respect the beliefs of others with equal passion, and to consider all positions with a critical and open mind.
- Students are expected to uphold the CTY Honor Code.
Assignment structure (rendered abstractly and unhelpfully):

General Format: Read/Lecture - Discuss - Activity
- All lessons will begin with readings and/or a short lecture, followed by open discussion and activities for both individuals and small groups.
- Activities will rotate between structured activities and unstructured time to work on individual/group projects
- **When reading and during lectures:**
  - Take notes on things that catch your interest for later discussion:
    - things you **want to talk more about**
      - Related to the news? Your life? Our future?
      - Raise discussion topics, related questions
    - things you **want to learn more about**
      - Potential research project? Individual activity?
      - What are you learning? What do you want to learn?
    - things **that connect to other things we’ve discussed**
      - Draw out interesting connections, analogies, parallels
      - Fill in the gaps!
    - things you **disagree with or find controversial**.
      - Do you disagree with the facts? With the values? With the argument?
        - With the conclusion?
      - Why the disagreement? Can it be resolved?
    - things **you have never thought about before**.
      - What new information, perspective, or insight have you gained?
- **When discussing:**
  - **RESPECT YOUR INTERLOCUTORS**
    - Have a point, make it clearly
      - Use examples, common references.
      - Get to the point.
    - Have the goal of prompting further discussion, triggering more thoughts and engagement from others
      - Don’t just occupy the floor. Use it constructively.
    - Listen to others, and consider what they say.
      - Don’t wait to speak. Listen!
      - Don’t speak to win.
- **When in groups:**
  - Share the load. Divide tasks in sensible ways. Ask for everyone’s input.
Activity Schedule:

Week 1: Open individual/group project
- Pick any topic, concept, event, theme, or other issue covered in the first week of class discussion and reading. Conceive of some project related to this issue. Execute on your project. **You have 5 total hours to complete this activity.**
- Work as individuals or groups. First pick topics, then pick groups.
- Potential projects types:
  - **Short argumentative essay**, ~ 2 pages. Take a stand, defend a position, clarify a principle, propose a resolution for action. Discuss the practical and theoretical consequences. Handle objections.
  - **Create an experience.** Write a poem, draw a picture, choreograph an interpretive multimedia dance. Prepare an artist’s statement relating your piece to the ongoing themes of the course. Art supplies can be made available.
  - **Deep research.** Dive deep into an issue. **In a ~5 minute presentation,** report back what you learn, why it’s important, and how it fits with the themes of the course. Computer/library time can be made available.
  - **Annotated bibliography.** Already an expert? Prepare an essential reading list of at least 4 sources. Provide historical context and commentary on your list to help interested parties navigate. Computer/library time can be made available.
  - **Other ideas? Propose them!**
- Present all work on Friday afternoon with HTEC A.
  - Learn from HTEC A. Teach HTEC A. Win CTY.

Week 2: AI debate
- On Friday of Week 2 we will have a debate with HTEC A over artificial intelligence and the nature of thinking.
- The debate will be in **Boston Masacre format** (to be explained in class)
- Topics and team composition will be decided on Friday. You will have time during the week to think about exactly the issues you’d like debated. You will also have time to prepare to defend your side of the debate.

Week 3: Final paper/research/creative project
- Just like Week 1, but this time it counts. More details to follow.

Week 1: What is human?

Sunday (evening): Introductions!
- **Ice breakers:** Bunny Bunny, Mind Meld, etc
- **Pre-assessment** (30 min)
- **Activity**: Brainstorms (individual writing 10 mins, then as pairs, then as small groups, then as a class, consolidating and simplifying at each step)
  - What is human?
  - What is nature?
  - What is technology?

**Monday: Ecce homo (or: become who you are)**

Reading goal: *Sapiens*, part one

**Morning:**
- **News** (20 min)
  - @htecb
  - No identifying images
    - CTY is watching. Respect future HTEC classes!
  - Klout
  - https://tweetping.net/
  - http://twistori.com/
- Syllabus, class policies and expectations (30 min)
- Continue/finish brainstorms (40 min)
- Activity: Quick write (10 min)
  - What are you most interest in learning about this session?
  - Of the three (Human, Nature, Technology), which most captures your attention?
  - Decorate the classroom
- Break
- Read *Sapiens* (40 min + 5 min notes)
- Open Discussion (10 min)
- Discussion: Hominid evolution (pg 3-19)
  - (cf pg 8-11) Human brain is not especially large

1 millions years of hominid evolution

**Afternoon:**
- Lecture: *Aristotle and the organization of things*
  - Read: *De anima* (15 mins)
  - *The great chain of being*
  - Group discussion: where to draw the lines?
    - One zoom (with viruses!)
    - Tree of life
Evening:
- Read *Sapiens* (40 min + 10 min discussion + 5 min notes)
- Weekly project brainstorm (1 hr)
  - What medium? What topic?
  - Individual or group?

How will you use the 4 remaining hours to work on this project?

**Tuesday: Agriculture and identity**

Reading goal: *Sapiens*, part two

**Morning:**
- **News** (20 min)
- Marx, *What distinguishes the worst architect from the best of bees*
- Read: *The virtues of thought*
- Open discussion on Aristotle
  - Endurance hunt
- Read *Sapiens* (40 min + 5 min notes)
  - The imagined order (pg 115 - 118)
- Lecture: **Fictionalism and narratives**
  - Mapping metaphor
  - Campbell's *Hero's Journey*
  - Dennett, *Breaking the Spell* pg 125-135
    - Aeolus
  - Wiki: *Ancestor Veneration*
- Open discussion (15 min)

**Afternoon:**
- Appiah: *Cosmopolitanism* (10 min)
- Lecture: Myths of self and identity
  - Gender and Agriculture (pg 144-160)
    - Reproduction (pg 84-88)
    - Sex and gender (pg 148 - 152)
      - Androgen Insensitivity Syndrome
  - Wajcman: *Feminist theories of technology*
    - FAB hypothesis
    - Mulder and Scully
  - Hacking: *Why race still matters*
- Presentation
  - Group discussion
  - Appiah: Multiple identities
  - Coda: This is water

Evening:
- Weekly project (1 hr)
  - Work on it! (40 min)
  - Rapid-fire present your project (1 min)
Read Sapiens (40 min + 10 min discussion + 5 min notes)

**Wednesday: Mind tools**

Reading goal: Sapiens, part three

Morning:
- **News** (20 minutes)
- Read *Sapiens* (40 min + 5 min notes)
  - Money (pg 180-187)
  - Empire (pg 190-204)
  - Harari Ted Talk: *What explains the rise of humans?*
  - Jesse Williams' BET acceptance speech
  - Religion (pg 211-216, 223-236)
- Dennett: **Mind tools**
- Open Discussion (20 min)
- **Cyborgs!**
  - Cybernetics: the science of control
  - Action-perception loop
  - Motor control
  - Change blindness
  - Disappearing hand trick
  - Nervous system
  - Stelarc
  - Thought control of robotic arms
  - Remote controlled animals
    - The roboroach
    - Roach beatbox
  - Man cries over losing his blackberry
  - Clive Wearing
  - Oscar Pistorius
  - Biohacks (video)
- Discussion (10 min)

Afternoon:
- **Haraway: Cyborg Manifesto**
  - Bacteriophage
  - Inner life of a cell
  - Autonomy in nonbiological systems
  - Characteristics of life
  - The modular body
  - The minimal agent
- **Natural Born Cyborgs / Extended mind**
  - Clark, *Natural born cyborgs*
  - Clark & Chalmers, *The Extended Mind*
  - Clark: *Extended mind extended*
  - Primate intellectual evolution
- **Activity:** *Network of the Self* Stage 1 (1 hr)
- **Coda:** *Future people are lonely*

**Evening:**
- Read *Sapiens* (40 min + 10 min discussion + 5 min notes)
- Weekly project (1 hr)
  - Work on it! (40 min)
You only have two more hours!!!!!!!!!!!!111

**Thursday: Gaming the system**
Reading goal: Sapiens, part four

**Morning:**
- **News** (20 min)
- Read *Sapiens* (40 min + 5 min notes)
  - Science and empire (271-278)
  - Science and capitalism (303-333)
- Discussion (10 mins)
- Mind and Attention
  - Neural plasticity
  - Word recognition from brain activity
  - Mirror therapy
  - Brain word map
- **How to make a meme**
- **Charting culture**
- Lecture: Social influence and moral psychology
  - Asch conformity experiments
    - Nudges and urinal flies
  - Milgram obedience experiments
  - Bystander effect
    - video
- **First Follower**
- **Activity:** *Parable of the Polygons* (15 min)
• Replicating systems of domination:
  ○ Roma descended from Dalit
  ○ Baltimore
  ○ Redlining Baltimore
  ○ Chicago
  ○ DC
  ○ Radical Cartography
  ○ Food Atlas
  ○ Incarceration by Race

• OCEAN test
• Dominance-Prestige test

Afternoon:
• Activity: The Prisoner’s Dilemma
  ○ Prompt
  ○ Scoresheets
• Network of the Self (1 hr)
• Coda: Balance

Evening:
• Weekly project (2 hr)
  ○ I lied you have six hours =P
Projects must be completed by the end of class.

Friday: Project Presentations
Finish Sapiens. Present on weekly activity.

Morning:
• News (20 min)
• Douglas Adams: How I learned to stop worrying and love the Internet
• C elegans connectome
  ○ c elegans robot
• Crumb of mouse brain reconstructed in full detail
• My brain
• Theory of Mind
  ○ Heider-Simmel demonstration
  ○ Sally Anne test
• Piaget developmental psychology
• Human genome project
• Human connectome
  ○ Structural brain network
  ○ Computer cords
• C. Elegans
  ○ C. Elegans robot
• Mouse connectome (mesoscale)
- Rat brain robot
- Complete remaining assignments, left over work
- Interclass project presentations

Afternoon:
- Finish presentations

Video: Billy's Balloon

Week 2: What is nature?

Monday: Complexity and chaos
Reading goal: Complexity part one

Morning:
- News (20 min)
- Read Mitchell (40 min + 5 min notes)
- Against reductive science
  - Circle of science
- Emergence and complexity
- Top down vs Bottom up constraints
  - In cognitive science
- Quasi-emergence
  - Emergence primer
  - Quasicrystals
  - second order motion
  - Second order motion 1
  - Second order motion 2
- Genuine emergence
  - Mayflies
    - Mayfly madness
  - Starlings
  - Fish schools
  - The wave (?)
  - Real time airtraffic (?)
- Social systems have both top down and bottom up constraints
  - Scale of human interaction
  - India driving
  - Traffic jams
- Millennium bridge
  - London bridge swaying
  - Metronomes syncing
  - Strogatz Science of sync
- Subways converge on an ideal form
  - Digital Matatus
  - Slime mold
- Loren Carpenter: Group Pong
  - TwitchPlaysPokemon Red
  - TwitchPlaysPokemon
- Badges
- Org org chart

Afternoon
- Welcome to the Anthropocene
- Lecture: History of temperature and climate (cf Sapiens pg 65-75)
Baez: Temperature
- Younger dryas temperatures
- 5 my of climate change
- 65 my of climate change
- Climate Change (climate.nasa.gov)
  - NASA CO2 model

Climate change calculator
- Inadequate

Population and GDP
- Open discussion
- Informal debate: geoengineering: Yea or Nay?

Evening:
- Read Complexity (40 min + 5 min notes)
- Open discussion

Tuesday: Biological autonomy and artificial life
Reading goal: Complexity part two & three

Morning:
- News (20 min)
- Read Sapiens (40 min + 5 min notes)
- Open discussion (10 min)
- Mt Probable
- Conway's Game of Life
  - Cellular automata
  - smooth life
  - Epic game of life
  - Life in life
- Biological autonomy
  - Estrada: Autonomy in nonbiological systems
  - vs technological complexity
    - Brain is almost an ideal network
    - Life is a process that for redistributing energy
  - Biology is awesome
    - Lookit
    - Lookit
    - LOOKIT
  - We are being controlled by random outcomes of a complex system
- Ants!
  - Deborah Gordon TED
  - Ants behave like fluid
  - Termites
o Ants and crowd behavior
o Division of labor in ants
  ■ perceptual landscapes

Afternoon:
  ● The logistic map (pg 27 - 39)
    o Logistic map widget
  ● Network theory (pg 227 - 257)
    o Graph theory for kids
    o Community detection in graphs
    o Jefferson High
    o Memes in a world with limited attention
    o Anatomy of a social graph
      ■ Three and a half degrees
    o Majority Illusion
      ■ Congress divides
    o Organization is a topology of relations
      ■ Network topologies
      ■ White blood cell
    o Zipf’s law
      ■ Small world
      ■ Protein interaction network
    o Emergence of Hierarchy
      ■ Complexity Rising
  o Erdos-Renyi Network

● Network of the self
● Human use of human beings

Evening:
  ● Read Complexity (40 min + 5 min notes)
Open discussion

Wednesday: Artificial intelligence and Turing’s test
Reading goal: Turing

Morning:
  ● News (20 minutes)
  ● Turing
    o Prezi
  ● Chatbots
    o Eliza
    o SimSensei
    o Cleverbot
    o Cleverbot vs Cleverbot
o **Eugene**
  ■ **Criticisms**
  ● **Ada lovelace = awesome**
  ● **Opportunity 10 years**
  ● **Computation**
    o **Turing Doodle**
    o **Finite state machine**
  ● **Introduction to classification and machine learning**
    o **A visual introduction to statistical learning**
    o **Crash course in deep learning**
    o Greg Hinton: *The next generation of neural networks* (demo @ 21:00 min)
    o **Tensorflow Playground**
      ■ **Teaching with Tensorflow**
    o **Parsey McParseface**

Afternoon: Robots!

● **Cynthia Breazeal**
  o **Kismet**
  o **Leo the Robot**
  o **Leo learning**
  o **Jibo**
  ● **DARPA loses**
    o **wins**
  ● **Robot learning**
    o **Robots learn to lie**
    o **Hector**
    o **Robot learns to say no**
  ● **Human vs Computer**
    o **Kasparov vs Deep Blue**
    o **Watson Jeopardy**
    o **Lee Sedol vs AlphaGo**
      ■ **Move 37**
      ■ **Move 78** (God move)

● **Pepper**
● **Kara**

Evening:
  ● **Read Complexity** (40 min + 5 min notes)

Open discussion

**Thursday: AI: The objections**

Reading goal: Searle
Morning:
- **Searle, “Minds, Brains, and Programs”**
  - “Only a human…”
- **Computer image fooled**
  - squares illusions
- **Robot drive through prank**

Afternoon:
- **Social robots**
  - Qrio is one of the kids
  - Wash U HINTS Lab
    - Robot asserting authority
    - Witnessing the moral violation of a robot
    - Yo Gabba Gabba: Robot friends
  - Cozmo
- **Robot ethics**
  - Defense of AI rights
  - Elon Musk: A potentially dangerous outcome
  - Campaign to stop killer robots
  - Samsung SGR-1
  - FLI Open Letter
- **Tweenbot**
- **Hitchbot**
- **Robot military funerals**
  - Soldiers become emotionally attached to robots
- **The handshake protocol**
- **Perceptual Crossing**
- **Drones**
  - Drone interactive
  - #notabugsplat

Evening:
- **Cyborg Stingray**
- **Debate Questions**

Finish personal network

**Friday: AI: The Debate**

Morning: Prepare
Afternoon: Debate
Shorts:
- **El Empleo**
- **Man**
- Everything will be okay
• The Maker
• Wirecutters
• Abiogenesis
• Story of R-32
They’re made of meat

Week 3: What is technology?

Monday: The cognitive surplus
Reading goal: WTW

Morning:

• News (20 min)
• Internet encyclopedias go head to head
• Cognitive surplus
• Kline, “What is Technology?”
  o How crayons are made
  o Six million dollar man intro
  o Natural vs artificial

Afternoon:

• Individuation and self-organization
• Self network Part 3

Evening:

• Read WTW
Discussion (10 min)

Tuesday: Internet tubes
Reading goal: WTW, part two

Morning:

• News (20 min)
• Foxconn suicides
• Augmented hyperreality
  o Hyperreality
  o Branding and logos
  o Media consolidation
  o VR Dystopia
• The Internet
o **ARPANET 1977**
  - Wiki: ARPANET
o **IP packet structure**
o **tracert**
  - Start menu -> cmd
  - ipconfig /all // find your IP address
  - ping [www.google.com] // Find the address of another website (DNS)
  - tracert [www.google.com] // display the complete path across the network to the target website
  - Whois lookup // find information on the computers in between

Afternoon:
- Class network
- Dubstep dispute
- Real time internet
  - Map of world social networks
  - one second internet
  - Detailed internet activity
  - Real time wikipedia changes
  - Emojitracker
  - Tweet geography
  - Live hacking map
    - Another
  - Internet map
  - 60%+ of internet traffic is nonhuman
- Net Neutrality
  - The Telecom dream scenario
  - Netflix extortion
    - Netflix = 37% of internet traffic

Evening:
- This video will make you angry
- Asimov: The last question
- Egan: Orphanogenesis

**Wednesday: Alienation in the digital age**
Reading goal: WTW

Morning:
- News (20 minutes)
- The young-girl and the selfie
  - Selfies in Art History
  - Kids on phones
  - All this technology is making us antisocial
• Alienation & Anonymity
• Heidegger: The question concerning technology
• No fun
• Princeton Museum
  ○ 10:45 AM

Afternoon:
• Zizek in a landfill
• What motivates us
• Camera
• Holy moment
• Class network

Evening:
Wrapping up!

Thursday: The technium
Reading goal: WTT

Morning:
• Connectivity atlas
• Final presentations
• SPEs

Afternoon:
• Prepare for post assessment
• Post assessment

Fountain

Friday: The end
Life goal: Be excellent to each other

Morning:
• The Great Dictator speech
• Dr. Strangelove (film)