Example Syllabus

Innovation in Society
FIS 201

Prof. Gregg Pascal Zachary
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Office: PEBW 112D
Office Hours: MTWHF 0:00-0:00 or by appointment

Course Description:
Science and technology are powerful forces in the modern world, driving innovations across every realm of civilization. Technological innovations have been hailed as a way to cure everything from world hunger to cancer. Even problems caused by innovation are viewed as reasons for more innovations. As a global society, technological innovation is, if not a secular religion, then an approach to sustainability and growth that is based on human knowledge and ingenuity, mediated by enterprise and complex socio-technical systems.

Innovation does not, however, happen automatically. Government, private enterprise and civil society each promotes a somewhat different innovation agenda, while often subscribing to the same core values and goals. In this course students will learn the basics of innovation through exploring fundamental questions that people of all walks of life ask every day. How did we get the technologies we have? Why did innovations reinforce power relations, while others destroy or disrupt them? How does our economic system spawn innovations and absorb them? What is the role of science, geography, culture and the university in the innovation process? Is there a system of innovation that can be described and engineered through policies and politics?

These questions will be examined through historical case studies and examples drawn from domains that long have been transformed by techno-scientific innovation: farming and food; national security and war; health and bio-medicine; trade and migration; land, natural resources and the environment.

In this class, we will learn about what innovation is, who funds it; why some innovations succeed and others fail; where innovation happens; who innovates and who benefits from innovation and who doesn’t; what’s the role of culture, values and history in fostering innovation; how do science and technology influence innovation; why has war, fear of war, and impending existential crises seem to stimulate breakthrough innovations; and finally what roles do government, private capital, civil society and scientists and engineers play in building, sustaining and revising the innovation system? We will study these questions through identifying and examining broader theoretical and thematic approaches as well as through historical case studies of innovation set in the U.S. and around the world.

All innovations are not equal. Sometimes, innovations that are inferior, technically, become standards; other times potentially valuable innovations are strangled by powerful actors in a society who wish to protect the position of existing ones. In understanding which innovations stick and why, and why change occurs or doesn’t, we will learn that location, culture, capital and politics influence the birth, life and death of innovations and the socio-technical systems they exist in. We will learn how to ask questions about the quality of
innovations? Do they promote equity? Are they consistent with human values? Do they solve urgent problems? We will also look at emergent innovations “paradoxes,” such as how advances in medical technology can lead to higher cost and reduced access to care; or why innovations in mobile phones and digital electronics seem to be accelerating, while innovations in energy and transport systems seem rare, costly and difficult.

To assist us in our task, we will adopt key concepts such as “the social construction of technological systems,” “path dependence,” “creative destruction,” and “unintended consequences” in order to make sense of complex transformations in human life. In the modern age, governments, multinational corporations and civil society movements have rallied around the idea that science and technology are necessary for the maintenance of health, prosperity and the good life generally. Studying the historical genesis of these ideas will help us to understand the assumptions that underlie them so that we can consider possible ways forward.

**Learning Outcomes:**

1. Students will become fluent in conversing about the fundamental questions regarding innovation and business, society and culture.
2. Students will learn how to analyze and evaluate emerging innovations in local, national and global contexts. They will gain sense for why some innovations “win,” while others “lose.”
3. Students will develop the ability to better understand contemporary issues through the analysis of historical case studies.
4. Students will gain an appreciation for the importance of critical approaches to technological innovations, policies, practices and societal outcomes.

**Required Books**

Watson, James, *The Double Helix* (1968)

*All other assigned readings supplied in digital form from instructor or available through ASU library*

**Assignments (and percentages of final grade)**

1. **Short Reflections:** Five times during the semester students will be asked to write a short reflection [no more than 250 words] in response to a prompt from the professor. [15 percent of grade]
2. **Team Project:** Each student will participate in a team project. Each team, consisting of four or five students, will conceive, specify and evaluate an innovation they develop in one of five areas: food, health, security, information or energy. Each team should draw on the history of one of these areas and analyze the current status of one aspect of one of those areas. The students will summarize their findings in a written memo, a short presentation in class, and a short video of 90 seconds. [15 percent of grade].
3. **Exam:** About a third of the way through the semester, students will have one in-class “fluency” exam that tests student command of basic concepts and issues in innovation. [15 percent of grade]

4. **Charismatic Leadership Paper:** Each student will choose from one of three charismatic leaders from science and technology: Steve Jobs, Rachel Carson, or Vannevar Bush. Students will read excerpts of biographies of their lives and then analyze the role that charisma played in the development of new technologies and scientific ideas. [20 percent of grade]

5. **Innovation in action:** Students will be asked to ride the Metro light rail and, through a series of photographs, illustrate the contours of this technological system and its effects on its surroundings at the level of the individual station. [15 percent of grade]

6. **Final Paper:** A final “creative” paper of 1,250 words that applies the lessons of the class to a problem in innovation studies [20 percent of grade].

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<td>Five Short Reflections</td>
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<td>Exam</td>
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<td>Charismatic Leadership Paper</td>
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<td>Innovation in Action Project</td>
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<td>Team Project</td>
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Barrett students interested in adding an **honors contract** to the class should contact the instructor in the first week of classes.

**Grading Scale:**

- **A-** / **A** / **A+**: 90.0-92.4/ 92.5-97.9/ 98-100 Excellent
- **B-** / **B** / **B+**: 80.0-82.4/ 82.5-87.4/ 87.5-89.9 Good
- **C-** / **C** / **C+**: 70.0-77.4/ 77.5-79.9 Average
- **D**: 60.0-69.9 Passing
- **E**: <60 Passing
- **XE**: Failure due to Academic

**Course Calendar**

**Week One: Understanding Technological Change in Economic, Historical and Cultural Contexts**

- Ceruzzi, “The Digital Age,” from *Computing,* c1
Week Two: Complexity and the Pillars of National Innovation Systems

- Dodgson-Gann, “Josiah Wedgwood: the world’s greatest innovator,” from *Innovation*, ch 1
- Excerpts from Vannevar Bush introduction to *Science – the Endless Frontier* (1945)
- **Short Reflection 1 Due**

Week Three: Economics and Innovation

- Schumpeter, J., excerpt from “The Process of Creative Destruction” (1950)
- Dodgson-Gann, “The process of creative destruction,” from *Innovation*, ch 2
- **Short Reflection 2 Due**

Week Four: Places: Geography, Culture and Innovation

- Ceruzzi, “The Chip and Silicon Valley,” from *Computing*, c 4
- **Short Reflection 3 Due**

Week Five: Science and Innovation

- Watson, James, *The Double Helix* (first half)
- **Exam**

Week Six: Innovation and the Charismatic Leader

- Ceruzzi, “The Microprocessor,” from *Computing*, chapter 5
- Watson, *The Double Helix* (second half)
- **Short Reflection 4 Due**

Week Seven: War, Environmental Crises and Innovation

- **Short Reflection 5 Due**
Week Eight: Innovation and Systems Builders

- Saxenian, A., *Silicon Valley’s New Immigrant Entrepreneurs* (Public Policy Institute of California, 1999)
- Charismatic Leadership Paper Due

Week Nine: When Innovations Fail, Despite Support of State, Market, Society

- Dodgson-Gann, “London’s Wobbly Bridge: Learning from Failure,” from *Innovation*, c3

Week Ten: Innovation as Risk: how Law, Universities, Migration, and Finance Capital combine to reduce the risks of innovation and raise the chances of success

- Dodgson-Gann, “Stephanie Kwolek’s new polymer: from labs to riches,” from *Innovation*, c4
- Innovation in Action Project Due

Week 11: From Imitation to Innovation: one path for the “catch-up” in the Developing World

- “Lights Camera Africa: Movies are uniting a disparate continent, and dividing it too,” *The Economist* (2010)
- Lee, Keun, “How can Korea be a role model for catch-up development?” (United Nations, 2009)

Week 12: Resistance to Innovation as Invitation to Responsible Innovation


• Hobsbawm, E.J., “The Machine Breakers,” Past and Present (1952)

• Team Project Due

Week 13: Communicating Innovation


• Ceruzzi, “Internet and World Wide Web, Computing, c5 and conclusion

• Dodgson-Gann, “Thomas Edison’s Organizational Genius,” from Innovation, c5

Week 14: What is innovation for?

• Dodgson-Gann, “Building a smarter planet?,” from Innovation, c6


• Final Creative Paper Due

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Incompletes: A mark of "I" (incomplete) can be given by the instructor when you are otherwise doing acceptable work but are unable to complete the course because of illness or other conditions beyond your control. You are required to arrange with the instructor for the completion of the course requirements. The arrangement must be recorded using the form at http://students.asu.edu/forms/incomplete-grade-request. Students should be proactive and discuss this with their instructor and TA before the end of the semester. Students who do not complete this form before the end of the semester cannot be given an incomplete and will be awarded a grade based on the work they have completed.

Late Assignments: Late assignments will have 1/3rd of a letter grade deducted each day they are late. Advanced written or e-mailed notice that you will miss a class or have to turn in an assignment late could help your cause.

Grade Appeals: ASU has formal and informal channels to appeal a grade. If you wish to appeal any grading decisions, please see: http://catalog.asu.edu/appeal

Student Standards: Students are required to read and act in accordance with university and Arizona Board of Regents policies, including: The ABOR Code of Conduct: Arizona Board of Regents Policies 5-301 through 5-308: http://www.azregents.edu/policymanual/default.aspx

Professionalism in the Classroom: While learning happens throughout ASU, the classroom is a particularly important focal point. Students are asked to contribute to a collegial atmosphere where ideas can be exchanged, discussed, and debated freely by avoiding disruptions through their own behavior and the distractions of their technology.
Disruptive, threatening or violent behavior will be dealt with according to the policies in the Student Services Manual, SSM 104–02. Students wishing to record lectures electronically must first get permission from the instructor.

It is impossible to learn from your fellow students when you or they are not there. As such attendance is required in this course. Should you have to miss a class, contact your instructor as far in advance as possible. Depending on the nature of the absence the instructor may elect to deduct points from your overall grade. Absences can be excused for religious observances or practices that are in accord with ACD 304–04 or university sanctioned events/activities that are in accord with ACD 304–02.

**Academic Integrity:** Academic honesty is expected of all students in all examinations, papers, laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see [http://provost.asu.edu/academicintegrity](http://provost.asu.edu/academicintegrity).

If you fail to meet the standards of academic integrity in any of the criteria listed on the university policy website, sanctions will be imposed by the instructor, school, and/or dean. Academic dishonesty includes borrowing ideas without proper citation, copying others’ work (including information posted on the internet), and failing to turn in your own work for group projects. Please be aware that if you follow an argument closely, even if it is not directly quoted, you must provide a citation to the publication, including the author, date, and page number. If you directly quote a source, you must use quotation marks and provide the same sort of citation for each quoted sentence or phrase. You may discuss assignments with other students, however, all writing that you turn in must be done independently. If you have any doubt about whether the form of cooperation you contemplate is acceptable, ask the TA or the instructor in advance of turning in an assignment. Please be aware that the work of all students submitted electronically can be scanned using SafeAssignment, which compares them against everything posted on the internet, online article/paper databases, newspapers and magazines, and papers submitted by other students. Turning in an assignment (all or in part) that you completed for a previous class is considered self-plagiarism and falls under these guidelines. Any infractions of self-plagiarism are subject to the same penalties as copying someone else’s work without proper citations. Students who have taken this class previously and would like to use the work from previous assignments should contact the instructor for permission to do so.

**Prohibition of Commercial Note Taking Services:** In accordance with ACD 304-06 Commercial Note Taking Services, written permission must be secured from the official instructor of the class in order to sell the instructor's oral communication in the form of notes. Notes must have the note taker’s name as well as the instructor's name, the course number, and the date.

**Student Support and Disability Accommodations:** In compliance with the Rehabilitation Act of 1973, Section 504, and the Americans with Disabilities Act of 1990, professional disability specialists and support staff at the Disability Resource Center (DRC) facilitate a comprehensive range of academic support services and accommodations for qualified
students with disabilities. **Qualified students with disabilities may be eligible to receive academic support services and accommodations.** Eligibility is based on qualifying disability documentation and assessment of individual need. Students who believe they have a current and essential need for disability accommodations are **responsible for requesting accommodations and providing qualifying documentation** to the DRC. Every effort is made to provide reasonable accommodations for qualified students with disabilities. Qualified students who wish to request an accommodation for a disability should contact their campus DRC at: [http://www.asu.edu/studentaffairs/ed/drc/](http://www.asu.edu/studentaffairs/ed/drc/). If you are a student in need of special arrangements we will do all we can to help, based on the recommendations of these services. For the sake of equity for all students, we cannot make any accommodations without formal guidance from these services.

**Sexual Violence and Harassment:** Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at [http://sexualviolenceprevention.asu.edu/faqs/students](http://sexualviolenceprevention.asu.edu/faqs/students).

**Drop and Add Dates/Withdrawals:** Please refer to the academic calendar on the deadlines to drop/withdraw from this course. Consult with your advisor and notify your instructor if you are going to drop/withdraw this course. If you are considering a withdrawal, review the following policies: [Withdrawal from Classes](#), [Medical/Compassionate Withdrawal](#).

**Email Communications**

All email communication for this class will be done through your ASU email account and the blackboard site. You should be in the habit of checking your ASU email regularly as you will not only receive important information about your class(es), but other important university updates and information. You are solely responsible for reading and responding if necessary to any information communicated via email. For help with your email go to: [http://help.asu.edu/sims/selfhelp/SelfHelpHome.seam?dept_pk=822](http://help.asu.edu/sims/selfhelp/SelfHelpHome.seam?dept_pk=822) and file a help desk ticket by clicking on “My Help Center.”

**Campus Resources:** As an ASU student you have access to many resources on campus. This includes tutoring, academic success coaching, counseling services, financial aid, disability resources, career and internship help and many opportunities to get involved in student clubs and organizations.

- **Tutoring:** [https://tutoring.asu.edu/tutoring](https://tutoring.asu.edu/tutoring)
- **Counseling Services:** [http://students.asu.edu/counseling](http://students.asu.edu/counseling)
- **Financial Aid:** [http://students.asu.edu/financialaid](http://students.asu.edu/financialaid)
- **Major/Career Exploration:** [https://cls.asu.edu/majorexploration](https://cls.asu.edu/majorexploration)
- **Career Services:** [http://students.asu.edu/career](http://students.asu.edu/career)
- **Student Organizations:** [http://www.asu.edu/studentaffairs/mu/clubs/](http://www.asu.edu/studentaffairs/mu/clubs/)