Science and Society in the 20th Century: Scope, Potential, and Problems of an Expanding Technological Imperative

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Prof. James Giordano, PhD

Office: GUMC, Bldg D, Rm 238.
Contact: 202 687-1160
james.giordano@georgetown.edu
Office hours: By appointment

Narrative Description of Course

Science and technology address perdurable philosophical questions of human societies and culture, and reciprocally influence, shape – and are influenced and shaped by – social, economic and geo-political agendas and directions. In short, science does not occur in a social vacuum, and societal trends are affected by, and influence the scope, trajectories and valence of scientific developments and their use or misuse. The 20th Century has been referred to as “the Age of Technology”, and rightly so, as perhaps no other era has borne witness and impact to the rapid and broad rise of science and technology as a social force. But, this reality prompts questions of what are the current and future effects of what philosopher Hans Lenk has called the “Technological Imperative”, how will societies assert meaning, value, and utility of extant and new scientific discoveries and technological capabilities, and how might we – as organizations, communities, and perhaps populations at large - negotiate the ways that science and technology should and should not be employed in pursuits of human flourishing, and socio-cultural agendas.

This course begins with an overview of late 19th century progress in scientific, academic and industrial enterprise(s) that set the stage for the rise of “techno-science” of the 20th century. The course proceeds to examine core tenets of scientific philosophy, and a presentation of the process of scientific investigation and discovery (i.e.- the scientific method), and its implementation in establishing the modern heuristic relationship of tools, techniques and theories. This provides a backdrop to the methodological – and social – momentum that led to expansive scientific and technological achievements of the 20th century; in this light, advances in the natural and physical sciences, including biology (with emphasis upon human biology), chemistry, physics, and engineering will be addressed. Achievements in these fields will be presented relative and relevant to the ways that epistemological capital and technical capabilities affected the social milieu, and have incurred ethico-legal and political issues, questions and problems. These issues afford a historical template upon which to examine the current practices of science and technology – and the need for pragmatic reflection and factual guidance of ethics, policies and
laws – to direct (if not govern) these enterprises upon a rapidly changing, evermore pluralist world-stage of the 21st century.

The course is designed to afford students in Liberal Studies better understand the role, value(s), and influence of science and technology as human endeavors for human endeavor. By presenting historicity as a basis for developing current – and future canon – the course is designed to enable students to examine historical fact(s), address those ways that socio-cultural meanings may define and shape the use of human tools and techniques, and in so doing sustain the dual goals of interdisciplinary inquiry and values reflection.

By beginning with a historicity and canon of modern science and technology, the course provides insight to those ways that socio-cultural and -political needs, values and agenda have shaped the state of scientific and technological progress and use. Analysis of historical trends as comparative indices viable for assessing and evaluating current and future possibilities establishes a solid groundwork for the type of casuistic analyses that is an important component in purposeful inquiry, and analysis. The overview of frontier areas of science and technology with regard to the extent and scope of new knowledge and capability, and the impact of application(s) of research and technology in the human dimension will ground students to current and future possibilities that may be realized by use (or misuse) of science and technology in the public sphere. Such uses are likely to incur ethical issues, problems and dilemmas, and this provides a basis upon which to establish a current and forward looking view of ethics, and ethical systems with which the student can employ to articulate a more formal approach to problem depiction and resolution, which are vital to the development of guidelines and public policy. In this light, paradigms for ensuring the probity and safety of science and technology, and a putative preparedness process and stance will be discussed.

In general, the course poses the following questions:

1. What are science and technology and how are they related – both as human (intellectual and creative) activities and as socially relevant entities?

2. What are the heuristics that leverage science and technology as social forces?

3. What are the values in/of science, and how are these influenced by/manifested in 20th century and current society?

4. How have particular domains of science and technology been leveraged and affected 20th century society?

5. What “object lessons” do such leveraging and effects bode for current and future regard and use of science and technology?

6. The Socratic inquiry: “from where have we come, and to where might we be going?”
Structure of the Course

This course is primarily based upon didactic lectures provided by the instructor and a set of key readings. The overarching goals are to (1) encourage active discourse, and (2) develop an increasingly sophisticated dialectical approach, as the material moves from historical presentation into more thought-provoking and participatory engagement of current trends in science and technology. This is aimed at fostering a synthetic approach to developing student insight, reflection, and critical thought about what science and technology represent, the scope and potential tenor of meaning and effect of scientific and technological achievements, and what can and should be done to guide, direct and govern progress trajectories upon the shifting cultural, economic and political architectonics of 21st century society. Students will be expected to participate in critical discussion of the course material in class and through the use of Blackboard forums.

Learning Goals:

- Develop clear understanding of the nature and practice(s) of interdisciplinary inquiry by actively addressing historicity to appreciate diverse perspectives on fundamental questions of science and technology as human enterprises executed within, and influenced by society. In this way, students foster a discursive and dialectical approach to the engage the strengths, limitations (and possible de-limitations) of disciplinary knowledge and methods of inquiry. This goal is developed by lecture content and supplementary readings that attempt to illustrate a variety of views of each focal topic, and which enable the student to appreciate the influence of philosophy, religions, psychology, economics and politics upon the scope and conduct of scientific and technological achievement.

- Practice skills of academic discussion and dialectic argument by developing and presenting an individualized explanatory position based upon support garnered through lecture and reading materials. This goal is supported by: 1) fostering an appreciation for a discursive-to-dialectical style of presenting scholarly material as demonstrated through/by the instructor’s lectures (and lecture style); 2) the development and submission of a short paper that requires the student to select a topic reflective of their own interests (that is relevant to the class focus and material) and allows a forum for the student to address, and summarize, critique and draw salient insights to a particular topic, and 3) building the short paper into a final paper that expands the initial ideas to engage an in-depth discussion, address, analysis and make conclusions and/or speculations about the topic in a formal academic style. Subsequent to grading, students will be offered the option to collaborate with the instructor to revise their papers toward submission to the peer-reviewed literature in consideration of professional publication.
Requirements:

1. **Class Contribution**, including regular participation in, classroom discussion, and one 20 minute classroom presentation of the short paper (see below). (20%)

2. **One Short Paper** (2000 words, fully referenced) upon a topic of students’ choice that addresses and elucidates a particular aspect of 20th century science relative to both its contemporary and future effect upon society, and the influence of social variables upon that science and/or technology. The paper topic should be vetted and approved by the professor no later than the fourth week of class. (30%)

3. **Final Paper**; (3000-5000 words fully referenced) that expands upon the short paper to explore in greater detail an issue, question, or problem in arising in/from some aspect of science and technology in 20th century – and/or future – society. The paper should be written in an accepted scholarly style (eg.- MLS, Vancouver or Chicago style), and should seek to synthesize and assimilate information gained throughout the course (lectures and readings) together with the students’ unique individual interests and readings into a working knowledge, analysis, critique and/or review. (50%)

Common Readings:


Supplemental Readings. Provided in class

A Note on Readings…

Note that readings are supplemental to the lecture material; readings are provided so as to prepare students (in advance) for lecture material, and/or be adjunctive information to the material provided in class lecture(s) and discussion(s). Readings selected from the texts afford information in this tenor.

Class Schedule:
Class 1. Introduction: Scope of course; requirements, policies.

2. Belief and understanding, dogma and doctrine: Confronting “Anselm’s paradox”
   Science and technology as human endeavor - and demiurge.
   Mythos, logos, the technological imperative and “mechanistic dilemma”.
   Readings:  
   MMS: Introduction
   Chapters 14, 15.
   STC: Introduction

3. Scientific method, science and technology (as reciprocal heuristics)
   Readings: Giordano J. Synesis (2014), provided
   Giordano J, Rossi PJ OJPP (2013) provided

4. The pace, tempo and impact of science and technology: Popper, Kuhn, Mach and Nagel.

5. The forging of 20th century science and technology as social forces:
   Out of the crucible of the Industrial Revolution(s)
   Readings:  
   MMS: Chapters 16, 17
   STC: Chapter 9

   (Paper topic due)

6. Humboldt, Darwin and 20th century biology
   Readings:  
   MMS: Chapters 6, 7, 18
   STC: Chapter 3

7. Psychology – a science of mind?
   Readings:  
   MMS: Chapter 13
   STC: Chapter 4

8. The biochemical turn: From chemistry to pharmaceutics
   Readings:  
   MMS: Chapters 3, 19.
STC: Chapter 5

9. The “new” science of physics: Atomic and quantum enigmas
   Readings:  MMS: Chapter 11 (Ch. 20 suggested too!)
              STC:  Chapters 6, 13 (Ch 11 and 15 suggested too)

10. The “estate” of science and the power of the “the state”
    Socio-economic and political agendas, biopower and biopolitics
    (Short paper and presentation due)
    Readings:  STC: Chapters 7, 8, 9, 10, 12

11. After Nuremburg: Capability, culpability and accountability in science.
    Readings:  STC: Chapters 14, 17, 18

    Readings:  MMS: Chapter 8
              Additional rdgs will be suggested and/or provided

13. Tools for intervention – and control
    Readings:  MMS: Chapter 21
              Additional rdgs will be suggested and/or provided.

14. Scientific convergence: Potential, panacea or problematic?
    Readings:  STC: Chapters 19, 20.
              Advanced rdgs in will be suggested and provided.

15. In utrimque paratus*: Utopias, dystopias, precaution, preparedness and policy
    (* “To be ready for both sides of the coin”)
    Final paper due one week after the last class.
Academic Standards: MALS and DLS students are responsible for upholding the Georgetown University Honor System and adhering to the academic standards included in the Honor Code Pledge stated below:

In the pursuit of the high ideals and rigorous standards of academic life, I commit myself to respect and uphold the Georgetown University Honor System: To be honest in any academic endeavor; and to conduct myself honorably, as a responsible member of the Georgetown community, as we live and work together.

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