**Course Notes Week 05**

To skip to the next major section, find ~~ (tilde), do Ctrl-F ~~

In the Wildemuth chapter section, to skip to the next chapter, do Ctrl-F ~

**~~Week 05 Overview**

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| **Brief introduction** | Please look at the modified calendar on p. 2.  Modification is due to a shift of emphasis to **Variables and Measurement**  There is not welcome video this week.  After identifying and evolving a topic of theoretical and/or practical significance, the second most important task in developing a research proposal is to define variables that are useful in describing and understanding the situation or phenomenon of interest. **This is the major theme this week**. Lecture 05.1 is very long (2 hrs, 10 min). Since this lecture has evolved to be more comprehensive than originally envisioned, I scrapped the required compilation of readings.  **Research ethics** (Lecture 05.2a, less than one hour) is a **free-floating topic; you can peruse this lecture at any time**. The now optional complementary compilation of readings will be available later. If you are interested in learning more about the approval of Human Subjects research (and research with animals), have a look at the reading by Dr. Dodge I picked up from SlideShare and reformatted.  Abstracts of many optional readings are in the Course Notes, and the Learning Blog template has a space for each of these readings. However, you may want to postpone dealing with these readings and focus on Lecture 05.1 and the Topic Definition instead.  **Interdisciplinary research and team science** is another **free-floating topic**. A short lecture and reading compilation will be available later.  Collaboration and interdisciplinary research are becoming increasingly important and are more and more preferred by funding agencies. Information professionals working in academic and research libraries should understand this to better support collaboration within and across institutions and to assist researchers from different disciplines to communicate with each other.  Interdisciplinary approaches are also important in K-12 education. School librarians can help by helping students and teachers find appropriate materials.  For later reference:  <https://www.k12academics.com/interdisciplinary-teaching>  <https://www.igi-global.com/chapter/interdisciplinary-k-12-teaching-and-learning/195321>  <https://www.ascd.org/books/meeting-standards-through-integrated-curriculum?chapter=using-standards-to-integrate-the-curriculum> |
| **This week's topics** | **No Topics from the Dimensions** |

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| **Week 05 09-29 ꟷ 10-05** | | |
| **05.0** | **$1** UBLIS575DS-05.0$1-CourseNotesWeek05  **$2** UBLIS575DS-05.0$2-**GreetingWeek05.pptx**  **$6** ►UBLIS575DS-05.0$6-LearningBlogWeek05.docx |  |
| **05.1** | **Variables and measurement**  **~~$1~~** ~~UBLIS75DS-05.1$1-ReadingsCompilationVariablesAndMeasurement.docx~~  **$2** UBLIS75DS-05.1$2-**Lecture05.1VariablesAndMeasurement.pptx** |  |
| **05.2a** | **$1** UBLIS75DS-05.2a$1-ReadingsAndResourcesForResearchEthics.docx Later  **$2** UBLIS575DS-13.1$2-Lecture05.2a**ResearchEthics**.pptx can do later |  |
| **05.2b** | **$1** UBLIS75DS-05.2b$1-ReadingsAndResourcesForTeamScience.docx Later  **~~$2~~** ~~UBLIS575DS-13.1$2-Lecture05.2b~~**~~InterdisciplinaryResearchAndTeamScience.pptx~~** |  |
| **Assignments due 10-05** | **$3** ■UBLIS575DS-03.2$3-**Deliverable2TopicDefinition.docx**  **$6** ■UBLIS575DS-05.0$6-LearningBlogWeek04.docx |  |

**~~Non-Wildemuth readings with abstracts**

These optional readings are not in the calendar but can be accessed in the Box folder for Week 05.

Optional

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| **~ Dodge Research Ethics IRB Focus.** 31 slides.  Dr. Dodge | |
| **Abstract** DS | A good summary of research ethics more narrowly construed and as related to the IRB and human subjects research applications, items not covered in DS lecture. |

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| **~ AERA Code of Ethics American Educational Research 2011.** 12 p.  American Educational Research Association | |
| **Abstract** from the document | The Code of Ethics of the American Educational Research Association (AERA) articulates a common set of values upon which education researchers build their professional and scientific work. The Code is intended to provide both the principles and the rules to cover professional situations encountered by education researchers. It has as its primary goal the welfare and protection of the individuals and groups with whom education researchers work. It also serves to educate education researchers, their students, and others who would benefit from understanding the ethical principles and standards that guide education researchers in their professional work. It is the individual responsibility of each education researcher to aspire to the highest possible standards of conduct in research, teaching, practice, and service.  Adhering to a set of ethical standards for an education researcher’s work-related conduct requires a personal commitment to a lifelong effort to act ethically; to encourage ethical behavior by students, supervisors, supervisees, employers, employees, and col- leagues; and to consult with others as needed concerning ethical problems. Each education researcher supplements, but does not violate, the values and rules specified in the ethical standards based on guidance drawn from personal values, culture, and experience. |

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| **~ American Sociological Association, Ethics 2009.** 21 p.  American Sociological Association | |
| **Abstract** from the document | The Code of Ethics (the Code) of the American Sociological Association (ASA or the Association) sets forth the principles and ethical standards that underlie sociologists’ scientific and professional responsibilities and conduct. These principles and standards should be used as guidelines when examining everyday scientific and professional activities. They constitute normative statements for sociologists and provide guidance on issues that sociologists may encounter in their work.  The ASA Code of Ethics consists of this Preamble, six General Principles, and a number of specific Ethical Standards. This Code is also accompanied by the Policies and Procedures of the ASA Committee on Professional Ethics (COPE), which describe the procedures for filing, investigating, and resolving complaints of unethical conduct.  The Preamble and General Principles of the Code are aspirational goals to guide sociologists toward the highest ideals of Sociology. Although the Preamble and General Principles are not enforceable rules, they should be considered by sociologists in arriving at an ethical course of action and may be considered by ethics bodies in interpreting the Ethical Standards.  The Ethical Standards set forth enforceable rules of scientific and professional conduct for sociologists. Most of the Ethical Standards are written broadly in order to apply to sociologists in varied roles, and the application of an Ethical Standard may vary depending on the context. The Ethical Standards are not exhaustive. Conduct that is not specifically addressed by this Code of Ethics is not necessarily ethical or unethical.  The foundation of a set of ethical standards for a sociologist’s work-related conduct rests on a personal commitment to a lifelong effort to act ethically; to encourage ethical behavior by students, supervisors, supervisees, employers, employees, and colleagues; and to consult with others as needed concerning ethical problems. Drawing from personal values, culture, and experience, sociologists may supplement, but must not violate, the values and rules specified in the Code of Ethics.  Sociologists should strive to adhere to the principles in the Code of Ethics. Membership in the ASA commits members to the Ethical Standards and the Policies and Procedures of the Committee on Professional Ethics (COPE). Members are advised of this obligation upon joining and renewing their membership in the Association, and also that violations of the Ethical Standards in the Code may lead to the imposition of sanctions, up to and including termination of membership. ASA members may be reviewed under these Ethical Standards only if the activity is part of or affects their scientific and professional functions. Personal activities having no connection to sociologists’ performance of their scientific and professional roles are not subject to the Code of Ethics. |

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| **~ Socially responsible research processes for sustainability transformation: an integrated assessment framework.** 11 p.  Katrin Daedlow; Aranka Podhora; Markus Winkelmann; Jürgen Kopfmüller; Rainer Walz; Katharina Helming | |
| **Abstract** from the document | Assessing the manner in which research is conducted is a key mechanism for leveraging a transformation in sustainability. Scientific answers to current sustainability threats are reliant on research design, conduct and dissemination. Thus, the research process itself merits a full consideration of its responsibility toward societal goals and values. Although the responsibility of research to society has recently been raised in scientific discourse, a systematic framework to guide such considerations that can be applied in a self-reflective manner across disciplines is lacking. Informed by a literature review that revealed an emerging discussion, this paper suggests an assessment framework for socially responsible research processes that integrates eight criteria: (1) approach to complexity and uncertainty, (2) ethics, (3) interdisciplinarity, (4) integrative approach, (5) reflection on impacts, (6) transdisciplinarity, (7) transparency and (8) user orientation. These criteria, including their respective linkages and ambivalent meanings, are elucidated. Implementation challenges, application trade-offs and opportunities with respect to an enhanced shift toward societal responsibility in research processes are discussed. |

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| **~ Deception in Research.** 5 p.  Michael Cheng-Tek Tai | |
| **Abstract** from the document | Informed consent is the most essential part of research ethics. The requirement to explain an experiment to the participants who provide tissues/information in order to obtain their voluntary consent is absolutely necessary in any research project. It is an expression of respect regarding the autonomy of the person who participates in the experiment. Why and how is informed consent required and what if some information is intentionally withheld to facilitate the participation? This paper will briefly review the history of informed consent, discuss the components of an ethically valid informed consent and examine deception in research. Sometimes, deception is used in Social, Behavioral and Educational Research (SBER) in order to obtain accuracy information. Can this be justified? There is no doubt that, for some psychological and sociological experiments, the less the subjects know the better. The Bystander Apathy Experiment and the Milgram Experiment will be used here as examples that are discussed and analyzed. In general, deception is not acceptable in human studies. Occasionally, it is necessary to mislead the participants who are subjects of a study in order to obtain unbiased information. The Institute Review Board (IRB) must review very carefully the proposals that use deception or misrepresentation. The reasons that deception is necessary for the study purpose need to be justified in depth and there must be provision in the procedures to protect the participants. When the study is completed, it is essential that a debriefing by the investigator is provided that explains any deception or incomplete disclosure involved; this should also help the subjects to deal with any distress or discomfort experienced in the research. |

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| **~ Dodge Research Ethics IRB Focus.** 31 p.  Dr. Dodge | |
| **Abstract** DS | A good summary of research ethics more narrowly construed and as related to the IRB and human subjects research applications, items not covered in DS lecture. |

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| **~ Guidelines for research ethics in the social sciences.** 44 p.  National Committee for Research Ethics in the Social Sciences and the Humanities | |
| **Abstract** from the document | The Guidelines for Research Ethics have been compiled to help researchers and the research community be cognizant of their ethical views and attitudes, raise their awareness of conflicting standards, promote good judgement and enhance their ability to make well-founded decisions in the face of conflicting considerations. The Guidelines presented in this booklet cover what are often known as cultural and social studies, i.e. social sciences, the humanities, law and theology. Like ethics in general, research ethics embraces both personal and institutional morality. Accordingly, the Guidelines contain standards that apply not only to individual researchers and research managers, but also to other bodies that exert influence on research and the consequences of research. The obligation to respect research ethics is part of responsibility for research in general. Individual researchers, project managers, research institutions and the appropriating authorities all share this responsibility. NESH’s role in following up of the Guidelines is to furnish advice and, upon request, to hand down opinions on questions of principle involving research ethics. The Committee has no judicial function in respect of accusations of breaches of the Guidelines for research ethics, nor does it have any authority to impose sanctions. |

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| **~ Research Ethics References.** 12 p.  Dr. Dagobert Soergel | |
| **Abstract** from the document | A few readings on research ethics compiled by D. Soergel 2021-05-02. |

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| **~ The Ethical Challenges of Socially Responsible Science.** 14 p.  David B. Resnik and Kevin C. Elliott | |
| **Abstract** from the document | Social responsibility is an essential part of the responsible conduct of research that presents difficult ethical questions for scientists. Recognizing one’s social responsibilities as a scientist is an important first step toward exercising social responsibility, but it is only the beginning, since scientists may confront difficult value questions when deciding how to act responsibly. Ethical dilemmas related to socially responsible science fall into at least three basic categories: 1) dilemmas related to problem selection, 2) dilemmas related to publication and data sharing, and 3) dilemmas related to engaging society. In responding to these dilemmas, scientists must decide how to balance their social responsibilities against other professional commitments and how to avoid compromising their objectivity. In this article, we will examine the philosophical and ethical basis of social responsibility in science, discuss some of the ethical dilemmas related to exercising social responsibility, and make five recommendations to help scientists deal with these issues. |

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| **~ Dangerous Science: Science Policy and Risk Analysis for Scientists and Engineers.** 164 p.  Optional  Daniel J. Rozell | |
| **Abstract** from the document | It is hard to overstate the importance of science and technology in modern society. Humans have been reshaping their lives and environment with technology since the dawn of the species. The first stone tools and controlled use of fire even appear to predate Homo sapiens. There are countless technological touchstones along the path of human history that have fundamentally changed how we live: agriculture, metallurgy, alphabets, and so on. However, the rate of technological change has substantially increased in recent centuries. At the dawn of the Industrial Revolution, the steam engine, with its many impacts from railroads to factories, was at the forefront of social change. Subsequent technological advances continued to transform society. Imagine a world today without refrigeration, electric power, vaccinations, airplanes, plastics, or computers. In the early 21st century, the work of Silicon Valley was perhaps the most public image of technology. However, technology encompasses a much broader range of tools and techniques that humans employ to achieve goals.  Given this fundamental role of science and technology in our lives, relatively little public discussion is focused on science and technology policy. Politicians frequently declare support for science research and technology development but have much less to say regarding exactly how or what innovation should be encouraged or avoided.  It is equally surprising how little of science and engineering training is spent on the social impacts of research and development. Most engineering students in the US are required to take a token course in engineering ethics, often a business ethics course tailored to engineers, which is treated separately from the technical coursework. Meanwhile, the physical sciences frequently require no training at all, while biological and social sciences usually require a short course in the appropriate treatment of animal or human test subjects. Some federal research grants require training in the responsible conduct of research—often weakly implemented (Phillips et al. 2018)—which focuses on the research and publication process. What happens after publication is given only cursory attention.  Few people would argue that scientists and engineers bear absolutely no responsibility for how their work is used. Yet the potential use of research can be difficult to predict, so it is also hard to argue that they bear total responsibility. So what is their level of culpability and what should they do? As with other tough questions without clear answers, the typical result is to politely ignore the issue or label it someone else’s jurisdiction. However, inaction comes with a price. Scientists and engineers, well-trained and comfortable in the lab or field, will occasionally find themselves under public scrutiny with inadequate training in science policy and risk analysis.  A particularly stressful scenario is when researchers announce or publish work only to receive a decidedly negative public reaction. No one wants their dedicated efforts, in which they take great pride, to be seen as dangerous science, but it happens. Research can be viewed as dangerous in either its practice or in its results. This danger can be broad. Some technologies may pose physical danger to humans or the environment. Other technologies are morally dangerous—they violate a common societal value, make crossing an ethical line easier, or simply cause more harm than benefits.  I hesitated to call this book ‘Dangerous Science’ because I did not want to alienate the intended audience with an alarmist and vaguely anti-science- sounding title. However, terms such as ‘controversial research’ or ‘unpopular technology’ do not quite capture the full impact of science and technology that meets public opposition. This book is intended for scientists and engineers, and it is important for this audience to understand that the science and technology that they work on could be dangerous on many levels. For example, real or perceived dangers to society can translate into real dangers to the careers of individual scientists and engineers.  The book’s subtitle is just as important. This is an introductory, but not simplistic, guide to science policy and risk analysis for working scientists and engineers. This book is not for experts in science policy and risk analysis: it is for the biologist considering synthetic biology research; it is for the computer scientist considering autonomous military equipment development; it is for the engineers and atmospheric scientists considering geoengineering responses to climate change. The public has already found some of the research within these fields objectionable, and it is wise to enter the policy arena prepared.  Scientists and engineers must be cognizant of cultural sensitivities, ethical dilemmas, and the natural potential for unwarranted overconfidence in our ability to anticipate unintended harm. This task can be both simple, yet difficult. On one hand, the writings and conversations of many scientists are often deeply self-reflective and nuanced. Yet, the fundamental core of science and engineering is empirical, analytical, and often reductionist—traits that can work against making connections between technology and society.  Science is often used to make public policy, and there is a perennial effort to increase ‘evidence-based’ public policy (Cairney 2016). Although they are related tasks, this book does not focus on how to use science to make good policy but rather how to use policy to make good science. Specifically, it explores the idea of dangerous science—research that faces public opposition because of real or perceived harm to society—and why debates over controversial research and technology are not easily resolved. More importantly, it also suggests techniques for avoiding a political impasse in science and technology policymaking. The target audience of this book is future or working scientists and engineers—people who care deeply about the impact of their work but without the time to fully explore the fields of science policy or risk analysis (it is hard enough being an expert in one field).  The French polymath Blaise Pascal was one of many authors to have noted that they would have preferred to write more briefly if only they had the time to shorten their work. Given that the seeds of this book were formed about a decade ago, I’ve made considerable effort to distill this work down to some- thing not overly imposing to the reader while avoiding the oversimplification of complex issues. The intent here is not to drown the reader in minutiae, but rather to lead the reader through an overview of the difficulties of assessing and managing science and technology with ample references for further reading as desired. The hope of such brevity is that it will actually be read by the many busy professionals who need to consider the societal impact of potentially dangerous science and do not want to find themselves unprepared in the middle of a political maelstrom.  While a primary audience of the book is the graduate student looking for a supplement to standard ‘responsible conduct of research’ required reading (e.g., Institute of Medicine 2009), the book is also written to be approachable by anyone interested in science policy. If there is one overarching lesson to be taken from this book, it is that science in the public interest demands public involvement. Science and technology have become too powerful to engage in simple trial and error experimentation. Before action, thoughtful consideration is required, and this benefits from as many ideas and perspectives as possible. Oversight must now be a communal activity if it is to succeed.  The general form of the book is laid out in the following sequence.  In the first chapter, a case study is presented that walks through the events and fundamental issues in one dangerous science example. In this case, it was the debate, starting in 2011, over gain-of-function research involving the H5N1 avian influenza virus that sparked public fears of a potential accidental pandemic. The description of the multi-year debate demonstrates the practical difficulties of assessing and managing dangerous science. It ends with the question of why a formal risk-benefit analysis commissioned for the debate failed to resolve the controversy.  In the second chapter, we tackle one part of that question and review the many ways in which the benefits of research can be defined. In addition, com- paring the various methods of estimating the benefits of research can provide insight into how science policy is formulated. We review data-driven methods of assessing research benefits, including estimating the effects of research on job production, economic growth, scientific publications, or patents. More subjective methods, such as value-of-information analysis and expert opinion, have also been recommended to account for less quantifiable benefits and public values. A comparison of the various legitimate, but essentially incomparable, ways that research benefits are assessed suggests that no form of assessment can be both quantitative and comprehensive. Discussing the strengths and weak- nesses of each approach, I argue there is currently no reliable or universally acceptable way of valuing research. The result is that formal assessments of research benefits can be useful for informing public science policy debates but should not be used as science policy decision criteria.  In the third chapter, we tackle the other half of the risk-benefit debate by reviewing the many factors that can compromise the perceived legitimacy of a risk assessment. Formal risk assessment is often idealized as objective despite many warnings that subjective value judgments pervade the risk assessment process. However, prior warnings have tended to focus on specific value assumptions or risk assessment topics. This chapter provides a broad review of important value judgments that must be made (often unknowingly) by an analyst during a risk assessment. The review is organized by where the value judgments occur within the assessment process, creating a values road map in risk assessment. This overview can help risk analysts identify potentially controversial assumptions. It can also help risk assessment users clarify arguments and provide insight into the underlying fundamental debates. I argue that open acknowledgment of the value judgments made in any assessment increases its usefulness as a risk communication tool.  In the fourth chapter, we acknowledge that policy formulation for controversial science and technology must often occur in the absence of convincing evidence. As a result, technology policy debates frequently rely on existing technological risk attitudes. I roughly categorize these attitudes as either technological optimism or skepticism and review multiple theories that have been proposed to explain the origins of these attitudes. Although no individual theory seems to provide a complete explanation so far, we do know that technological risk attitudes are flexible and influenced by a complex range of factors that include culture and personal circumstances. An important result of these opposing attitudes is that moral arguments against dangerous science are often down- played and policymakers tend to act cautiously permissive. Several emerging technologies, such as human genome editing, synthetic biology, and autonomous weapons, are discussed in the context of technological risk attitudes.  In the fifth and last chapter, we turn to potential solutions for managing science controversies. After briefly reviewing traditional risk management techniques, I argue dangerous science debates should place less emphasis on attempting to quantify risks and benefits for use as a decision tool. Rather risk- benefit assessments are better used as risk exploration tools to guide better research design. This is accomplished by engaging multiple perspectives and shifting away from traditional safety and security measures toward more inherently safe research techniques that accomplish the same goals. The application of these principles are discussed in the example of gene drive technology.  One final remark on the book’s contents: There is plenty of ammunition in this book for science ‘denialists’ if they engage in cherry-picking. Despite the critiques of particular lines of research or methods presented here, this book is not an attack on the enterprise of science, which has incalculable practical and intellectual value to society. Generally, more science is better. However, it is antithetical to the progress of science to take the authoritarian approach of ‘You’re either with us or against us’ and to avoid all valid criticisms of how science is conducted. The purpose here is to improve the process for assessing and managing the broader impacts of science. Open discussion is the only way forward. |