PHIL 455W/804 Measurement in Science

Fall | 2022

Instructor Information

Instructor	Class time & location	Office hours & location
Kino Zhao (she/her)	Tuesdays 17:30-20:20	Tuesdays
[email]	[location]	[location]

General Information

Course Description

"…measurement, in the broadest sense, is defined as the assignment of numerals to objects or events according to rules." So writes psychologist S. S. Stevens in 1946. In this broadest sense, measurement is what turns the experiential world into something that science can work with. Despite its importance, measurement is often overlooked in philosophical (or even scientific) discussions of the scientific method. We often assume that we get data directly from the world, and that the empiricist project starts only after we all make the same (single, correct) observations.

This class introduces students to the (limited but slowly increasing) literature on scientific measurement. The literature itself is quite fragmented and primarily consists of writings by non-philosophers in non-philosophical contexts. There is no grand framework or agenda. Students are encouraged to pick and choose parts of the class to emphasize on, and to connect class content with their existing philosophical interest.

Reading

All material will be posted online.

Note: There are many "optional" readings. These are for students who would like to explore a particular topic for research purposes (such as to write a long paper on it). Students are not encouraged to read all of the optional readings for the class.

Assessment

Choose between the following grading schemes:

1. **2 Short Papers (30% x 2 = 60%) + Discussion Questions (20%) + Discussion Lead (20%)**
2. **Long paper (80%) + Short Presentation (20%)**

Discussion Questions (2% x 10 = 20% of total grade)

Every week (except the 1st and 10th week), you can submit a discussion question online for 2% (marked by completion), for a maximum of 20% total.

Discussion Leading (20% of total grade)

Choose a week to lead class discussion. You should read over discussion questions others have submitted and try to cover the emerging themes. You can also bring up perspectives especially interesting to you.

Short Papers (30% x 2 = 60% of total grade) (4-5 pages each)

This option is intended for students who are interested in learning class material but not in engaging with it as a researcher. For summary papers, identify 2 or 3 readings from the course, summarize the main arguments

from each, and discuss how they relate to or differ from each other. A list of suggested topics can be found in a separate document.

Long Paper (80%) (15-20 pages)

This option is intended for students who want to write a research paper. Technically only the final draft is graded, but I'll provide a series of benchmarks to help first-time research-paper-writers stay on track. These can be found in a separate document. Missing these benchmarks will not affect your grade. If you are thinking about potentially using this paper as a writing sample or portfolio paper, please let me know (it should affect the kind of thesis you pursue).

Short Presentation (20%) (20-min max)

In week 10, people writing long papers will give a short presentation of your ideas to receive comments. You'll get full grade as long as you do it. Please take this as an opportunity to practice presenting your own ideas and to get some feedback them.

Schedule

Week	Date	Topic	Reading
		Unit 1: theories of measurement	
Week 1		Going over this syllabus Mathematical measurement theory	> Diez 1997 - A Hundred Years of Numbers. A Historical Introduction to Measurement Theory 1887-1990 Part I > (Optional: Part II of Diez) > (Optional: Suppes 1954 - Some Remarks on Problems and Methods in the Philosophy of Science) > (Optional: Campbell 1938 - Measurement and its importance for philosophy)
Week 2		Operationalism, verificationism, logical positivism Anti-realist views of measurement	> Chang 2019 – SEP article on operationalism https://plato.stanford.edu/entries/operationalism/ > Bogen & Woodward 1988 – Saving the Phenomena > (Optional: Hardcastle 1995 - S. S. Stevens and the Origins of Operationism)
Week 3		Neo-operationalism Realist views of measurement	> Chang 2001 – How to Take Realism Beyond Foot-Stamping > Vessonen 2020 – Respectful Operationalism > (Optional on realism: Stein 1989 - Yes… But) > (Optional on realism: Fine 1984 – The Natural Ontological Attitude)
Week 4		Psychometrics: Classical Test Theory (CTT) and Item Response Theory (IRT; also known as Latent Variable Theory)	> Excerpts from Borsboom 2005 – *Measuring the Mind* > McClimans, Browne, & Cano 2017 - Clinical outcome measurement Models, theory, psychometrics and practice

Week	Date	Topic	Reading
			> (Optional: Traub 1997 – Classical Test Theory in Historical Perspective) > (Optional: Simms 2008 – Classical and Modern Methods of Psychological Scale Construction)
		Unit 2: theories of validity	
Week 5		Realist views of validity	> Cronbach & Meehl 1955 – Construct Validity in Psychological Tests > Loevenger 1957 – Objective Tests as Instruments of Psychological Theory > Borsboom 2004 – the Concept of Validity > (Optional: Borsboom & Markus 2013 – Truth and Evidence in Validity Theory) > (Optional: Shaw & Crisp 2011 - Tracing the evolution of validity in educational measurement)
Week 6		Anti-realist views of validity **Short paper 1 due by Friday night**	> Excerpts from Kane 2013 – Validating the Interpretations and Uses of Test Scores > Anastasi 1950 – The Concept of Validity in the Interpretation of Test Scores > Shepard 2016 – Evaluating Test Validity: Reprise and Progress > (Optional: Chapter 1 of the 2014 Standards for Educational and Psychological Testing)
		Unit 3: new philosophical writings on measurement	
Week 7		Thick ethical concepts	> Pekka 2021 – SEP article on thick ethical concepts https://plato.stanford.edu/entries/thick-ethical-concepts/ > (Optional: Abend 2019 – Thick concepts and sociological research)
Week 8		Well-being science	> Alexandrova 2008 – First-person reports and the measurement of happiness > Angner 2013 – Is it possible to measure happiness? > (Optional: de Boer 2014 – Scaling happiness) > (Optional: Skidelsky 2014 – What can we learn from happiness surveys?)
Week 9		Model-based measurement	> Tal 2019 – Individuating Quantities
Week 10		**Presentation week**	
		Unit 4: empirical accounts of measurement	

Week	Date	Topic	Reading
Week 11		Chang on measuring temperature **Short paper 2 due by Friday night**	> Excerpts from Chang 2004 – *Inventing Temperature*
Week 12		Porter on the history of accounting	> Excerpts from Porter – *Trust in Numbers*
Week 13		Merry on global indicators	> Excerpts from Merry – *The Seduction of Quantification*

Last updated May, 2022