BIAS-NRT

2024

2024 TRAINEE HANDBOOK

NRT-HDR: DETECTING AND ADDRESSING BIAS IN DATA, HUMANS, AND INSTITUTIONS

PREPARED BY:
KRISTEN KALB-DELLARATTA, PROJECT COORDINATOR

Stony Brook University

NSF

Welcome to the NSF Research Traineeship, *Detecting and Addressing Bias in Data, Humans, and Institutions*!

TABLE OF CONTENTS

MISSION

Data science and AI are powerful tools for generating new knowledge, fueling innovation, and dealing with society's most pressing problems. However, "big data" and machine learning tools can perpetuate biases that advantage some people, and disadvantage others. The National Science Foundation Research Traineeship, *Detecting and Addressing Bias in Data, Humans, and Institutions* (Bias-NRT), takes an interdisciplinary approach to bias of many kinds, and the impacts on data and human well-being.

Bias-NRT consists of a two-way bridge for training students from the human-centered sciences (Economics, Linguistics, Political Science, Psychology, Neurobiology and Behavior, and Sociology) in computer and data science coursework, as well as to train data science students (Computer Science and Applied Mathematics & Statistics) on how to address human-centered problems. Within joint research practica along with curated course tracks, trainees seek to better define and identify bias, as well as understand how machine learning and artificial intelligence are affected by bias.

Back row: Susan Brennan (Graduate Program Director and Professor, Cognitive Science Program, Psychology), Jeffrey Heinz (Professor, Linguistics/IACS core faculty), Adryan Wallace (Assistant Professor, Africana Studies/Women's Studies/Political Science), CR Ramakrishnan (Professor and Graduate Program Director, Computer Science), Reuben Kline (Associate Professor, Political Science). Front row: Wei Zhu (CEAS Associate Dean for Academic Affairs and International Programs; Professor, Applied Mathematics and Statistics, and IACS affiliate faculty), Bonita London (Professor, Social and Health Program, Psychology), Owen Rambow (Professor and IACS Endowed Chair, Linguistics/IACS) Photo by John Griffin

MEET OUR TEAM

TRAINEES

2022-2023 Cohort 1

Rosa Bermejo
Karin Hasegawa
Pei-Hsun Hsieh
Kalina, Kostyszyn
James May
John Murzaku
Veronica Oelerich
Sekine Ozturk
Amie Paige
Medhini Urs
Carl J. Wiedemann

2023-2024 Cohort 2

Alexandra Anthonioz
Tina Behzad
AJ Castle
Gilvir Gill
Dana Golden
Dakota Handzlik
Benjamin Hechtman
Brett Indelicato
MacKenzie Johnson
Adil Soubki
Ignacio Urbina
Zhengxiang Wang
Evan West

***NEW* 2024-2025 Cohort 3**

Amit Kumar Das
Kiera Gross
Srivardhan Jangili
Weiling Li
Darya Likhacheva
Ritik Raina
Peter Zeng

FACULTY PIs

Principal Investigator
Susan E. Brennan
SUNY Distinguished Professor and Graduate Program Director, Psychology
Affiliated, Departments of Computer Science and Linguistics

Co-PI
C.R. Ramakrishnan
Professor and Graduate Program Director, Computer Science

Co-PI
Wei Zhu
Professor, Applied Mathematics & Statistics
CEAS Associate Dean for Academic Affairs and International Programs

Co-PI
Jeffrey Heinz
Professor, Linguistics
IACS Core Faculty

Co-PI
Bonita London
Professor, Psychology
CAS Associate Dean for Research

ADDITIONAL FACULTY

Niranjan Balasubramanian
Assistant Professor, Computer Science

Hugo Benítez-Silva
Associate Professor, Undergraduate and MA Director, Economics

Braden Brinkman
Assistant Professor, Neurobiology & Behavior

Mónica Bugallo
Professor, Electrical and Computer Engineering
Vice Provost for Faculty and Academic Staff Development

Jason J. Jones
Associate Professor, Sociology

Reuben Kline
Associate Professor, Political Science

Christian Luhmann
Associate Professor, Psychology

Klaus Mueller
Professor, Computer Science
Interim Department Chair, Technology & Society

Owen Rambow
Professor, Linguistics
IACS Endowed Chair

H. Andrew Schwartz
Associate Professor, Computer Science

Steven Skiena
Distinguished Teaching Professor; SUNY Empire Innovation Professor and Director, AI Institute, Computer Science

Adryan Wallace
Assistant Professor, Africana Studies
Affiliated, Departments of Political Science and Women's, Gender, & Sexuality Studies

EXTERNAL EVALUATOR

Catherine Good
Associate Professor, Baruch College
Department of Psychology
catherine.good@baruch.cuny.edu

PROJECT COORDINATOR

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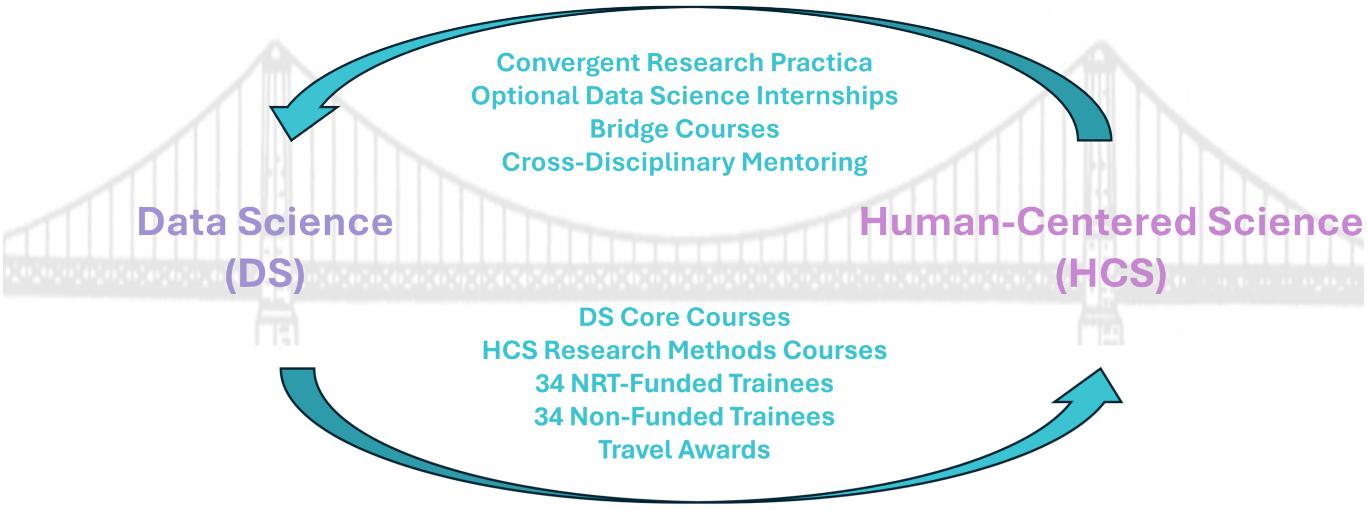
TRAINING MODEL

THE TRAINING MODEL



The National Science Foundation Research Traineeship project, *Detecting and Addressing Bias in Data, Humans, and Institutions*, takes an interdisciplinary approach to bias of many kinds, and the impacts on data and human well-being. The training model consists of a two-way bridge for training students in the human-centered sciences (HCS) in computer and data science coursework, as well as to train data science (DS) students on how to address human-centered problems. The human-centered sciences include Economics, Linguistics, Political Science, Psychology, Neurobiology & Behavior, and Sociology. The data sciences include: Applied Mathematics & Statistics and Computer Science.

PhD students from both HCS and DS departments will have their choice of course track. The Focus of Artificial Intelligence is open to any HCS student or Applied Math & Statistics student. The Advanced Graduate Certificate in Human-Centered Data Science is open to both DS and HCS trainees. All trainees are expected to participate in *at least* 2 years of Research Practica (0-3 credits), where trainees and faculty across disciplines will collaborate on convergent research projects pertaining to bias in data, humans, and institutions.

Within joint research practica, trainees will seek to better define and identify bias, as well as to understand how machine learning (ML) and artificial intelligence (AI) are affected by bias. Trainees from PhD programs from the HCS side will garner new skills and techniques for data manipulation and research. Trainees from PhD programs from the DS side will gain an understanding about where data come from, and an insight into the human side of research methods.

TRAINEE REQUIREMENTS

TRAINEE REQUIREMENTS

Currently enrolled in a PhD program in one or more of the participating departments *(Applied Mathematics & Statistics, Computer Science, Economics, Linguistics, Neurobiology & Behavior, Political Science, Psychology, and Sociology; exceptions may be considered depending on the student's preparation and focus)*
Remain in good standing in home PhD program
Expect to enroll/participate in *at least* **2 years of Research Practica** *(0-3 credits; to be taken over the course of the traineeship)* Funded-Fellows are required to participate in Research Practicum meetings for the entirety of their funding. Research Practica require collaboration on convergent research projects with other trainees.
Plan to participate/enroll in courses pertaining to your chosen focus or certificate *(We are currently in the process of applying for SUNY approval for the following graduate certificate: The Advanced Graduate Certificate in Artificial Intelligence (intended for human-centered scientists with strong preparation, or AMS students; CS students are not eligible for this certificate)*
Contribute to yearly evaluations (required by NSF, the funding agency) that will involve responding to occasional surveys, interview requests, and calls for research highlights
Participate in NRT-related, community building activities
Remain involved with the project until graduation

PROGRAM ELEMENTS

Course Tracks

A Focus in Artificial Intelligence

The Advanced Graduate Certificate in Artificial Intelligence is currently awaiting SUNY/NYSED approval (prior to approval, the certificate is classified as a “focus”). However, human-centered science trainees with strong computational preparation are encouraged to enroll in courses that *may* eventually lead to this advanced graduate certificate. The Focus of Artificial Intelligence is available to PhD students in the following departments: Applied Mathematics & Statistics, Economics, Linguistics, Neurobiology & Behavior, Political Science, Psychology, and Sociology.

A Focus in Artificial Intelligence	
This focus requires 12 credits (four courses), at least one of which must be CSE 512: Machine Learning or CSE 537: Artificial Intelligence. The remaining courses can be chosen from the list below. Please note: an elementary knowledge of programming is preferred.	
CSE 505: Computing with Logic CSE 512: Machine Learning CSE 519: Data Science Fundamentals CSE 525: Robotics CSE 527: Computer Vision	CSE 537: Artificial Intelligence CSE 538: Natural Language Processing CSE 544: Probability and Statistics for Data Scientists CSE 545: Big Data Analytics CSE 564: Visualization

Students without formal preparation in Computer Science may count up to two of the following graduate-level preparatory ("bridge") courses toward the focus and should consult with the admission committee before taking the other graduate CS courses.

CSE 581, Computer Science Fundamentals: Theory
CSE 582, Computer Science Fundamentals: Data Structures and Algorithms
CSE 583, Computer Science Fundamentals: Programming Abstractions

Advanced Graduate Certificate in Human-Centered Data Science

The Advanced Graduate Certificate in Human-Centered Data Science is available to PhD students in the following departments: Applied Mathematics & Statistics, Computer Science, Economics, Linguistics, Neurobiology & Behavior, Political Science, Psychology, and Sociology.

Advanced Graduate Certificate in Human-Centered Data Science

This certificate requires **12 credits (4 courses)**: 2 core DS/CS courses and 2 electives
*Requires Python Knowledge **Instructor Consent Required

DS/CS Core: Both of the following

- Algorithms: **CSE 582: Computer Science Fundamentals: Data Structures and Algorithms**
  - Alternative: AMS 542/CSE 548: Analysis of Algorithms *or* **AMS 561/DCS 521: Introduction to Computational and Data Science
- Machine Learning: **AMS 580: Statistical Learning**
  - Alternative: *AMS 520: Machine Learning in Quantitative Finance *or* CSE 512: Machine Learning

Two electives chosen from the courses below. At least one must be outside of the student's home department and not cross-listed. Note that courses outside of the home department require permission from the instructor. Admission to this certificate does not guarantee instructor approval.
Courses outside this list may be used to satisfy the electives requirement with prior permission of this focus program's director.

AFS 502: Research Methods in Africana Studies
AFS 533: Race, Gender, and Globalization
*CSE 564: Visualization (AMS and CS students require approval)
ECO 522: Applied Econometrics
ECO 612: Computational Economics and Dynamic Modeling
ECO 640: Labor Economics I
ISE 503: Data Management (AMS and CS students require approval)
LIN 521: Syntax I
LIN 523: Phonology I
LIN 637: Computational Linguistics 2
NEU 534: Principles of Neurobiology

NEU 536: Introduction to Computational Neuroscience
NEU 537: Neurotransmission and Neuromodulation
NEU 547: Introduction to Neural Computation
POL 633: Social Influence in Political Decision Making
POL 676: Advanced Topics: Methods I
PSY 507: Meta Analysis
PSY 513: Theories of Attention
PSY 520: Psycholinguistics
PSY 549: Prejudice and Discrimination
PSY 620: Bayesian Analysis
SOC 504: Logic and Practice of Sociology
SOC 556: Political Sociology
SOC 561: Cultural Sociology

In addition to the 12-credits, all students enrolled in the HCDS Focus will have to complete the online Citi Training Module, "Human Research," (for 0 credits; students will receive a certificate of completion to document this requirement). https://www.citiprogram.org/

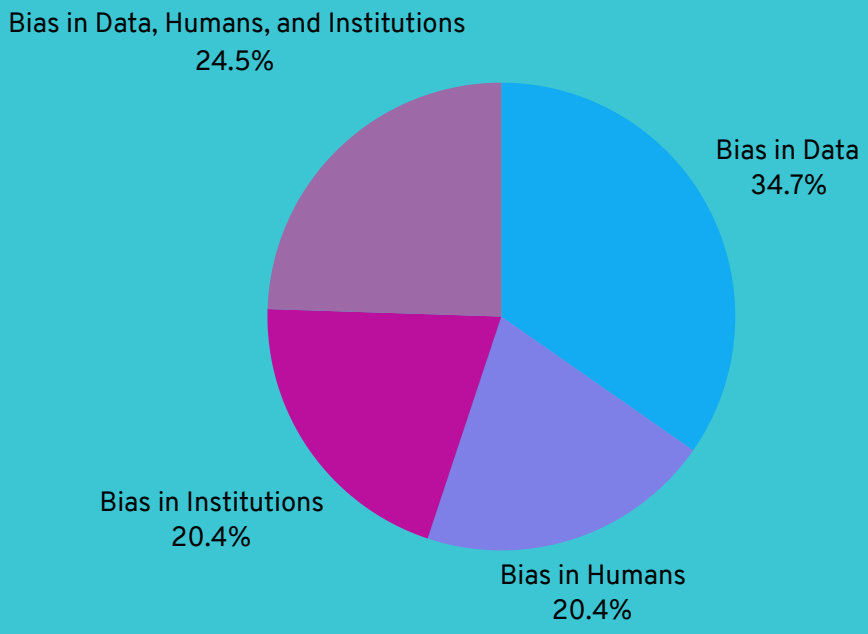
Research Practica

Research Practica are offered every fall and spring semester during the course of the project as 0-3 credit special topics courses (that can be retaken for credit). **As an incoming trainee, you will start by enrolling in the Fall Research Practicum, where you will gain basic knowledge about current topics related to bias in data, humans, and institutions.** The following spring semester is focused on conducting research with faculty and trainees from other disciplines, engaging in collaboration, and presenting your work. These are collaborative and supportive settings, where trainees and faculty alike have the opportunity to learn from one another.

Fellows (NRT-funded trainees) are required to participate in Research Practicum meetings for the entirety of their funding period (up to 2 years/4 semesters). Non-funded trainees are required to enroll in at least 2 seminars, but expected to remain active participants.

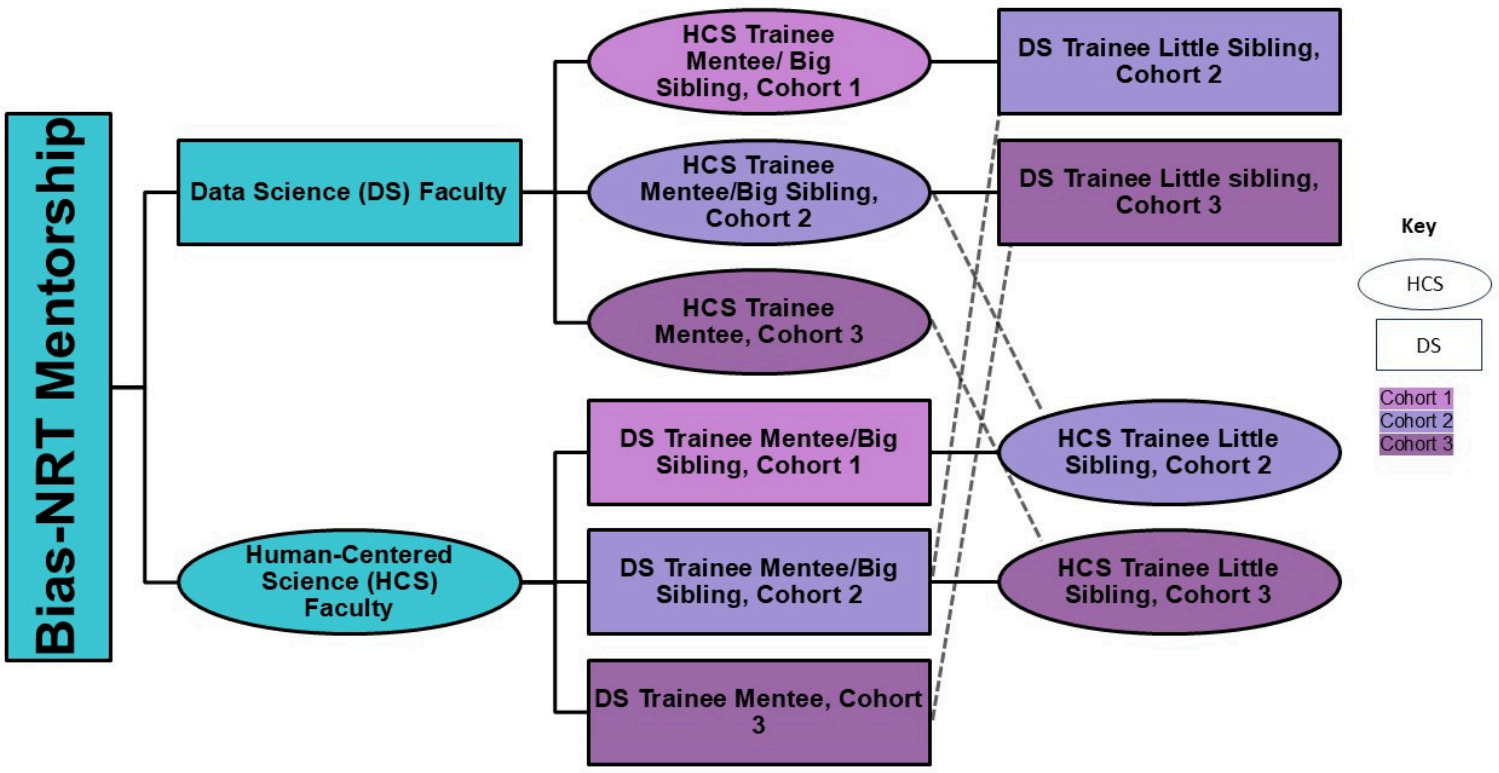
All new incoming trainees must enroll in the Fall Research Practicum of their application year.

Past Research Practicum Topic Themes Fall 2022-Spring 2024



Fall 2024 Research Practicum

Course: AFS 502: Research Methods in Africana Studies
Class #: 89187
CMP/SCT: SEM 01
Days: Wednesdays
Time: 3:30-6:20
Start Date: 08/26/2024
End Date: 12/19/2024
Building: Humanities
Room: 3018
Instructor: Adryan Wallace
Credits: 0-3



MENTORSHIP

The goal of the Bias-NRT Mentorship Program is to create dynamic relationships that foster growth, self-expression, and honesty. Faculty mentors are matched with a trainee(s) from "across the bridge;" data science faculty are matched with human-centered science students and vice versa. Bias-NRT faculty mentors differ from traditional, formally assigned program advisers in that they are *not* expected to provide guidance on research or dissertations.

Trainee mentors, "Big Siblings," act as guides for newer, incoming trainees from each subsequent cohort, also from "across the bridge." The Bias-NRT mentorship structure aims to create a web of interconnected faculty and students across disciplines and fields, building relationships upon the foundation of the traineeship. Bias-NRT is focused on establishing a *mentorship culture;* social gatherings, Research Practica, and group projects, all serve to further build a mentorship culture as well as a distinct community (Johnson et al., 2023).

The Project Coordinator will be contacting you with your assigned mentorship matches at the start of the fall semester.

Johnson, W. B., Long, S., Smith, D. G., & Griffin, K. A. (2023). Creating a mentoring culture in graduate training programs. Training & Education in Professional Psychology, 17(1), 63–70. https://doi-org.proxy.library.stonybrook.edu/10.1037/tep0000404

RESOURCES

NSF ACKNOWLEDGEMENT

Please note that Trainees with fellowship (**and/or travel award**) support need to acknowledge the Bias-NRT program in their posters/talks/publications. Please use the text format below:

"This material is based upon work supported by NSF under Grant NRT-HDR 2125295. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation."

HOW TO APPLY FOR FUNDING

Most participants will be admitted initially as trainees (non-funded); there are no citizenship requirements for trainees, so students from all countries are welcome. Fellows (trainees funded by NSF for stipends of $37K) must be either U.S. citizens or permanent residents and can apply for one year of funding, with the *possibility* of renewal for a second year. All trainees/fellows are eligible for research and travel awards. The application for funding as well as travel funds can be found on our website under, “Resources” --> “Trainee Resources.”

Dr. Kathleen Ehm conducting a professional development workshop for our trainees at the Spring 2024 Research Practicum.

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