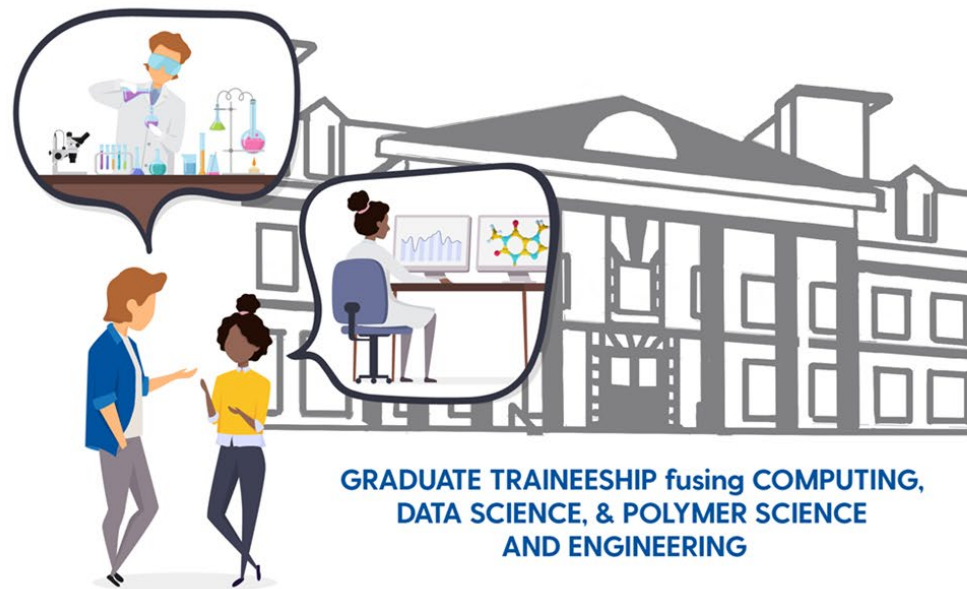


NSF-funded **NRT**: Computing and Data Science Training for Materials Innovation, Discovery, & Analytics (**MIDAS**) program

by

NRT Director: Prof. Arthi Jayaraman & NRT Program Coordinator: Ms. Jennifer Johnston



NRT Director & NRT Program Coordinator

NRT Director
Prof. Arthi Jayaraman
PI, NSF-NRT grant



NRT Program Coordinator
Jennifer Johnston





NSF NRT GRADUATE TRAINEESHIP

NRT: Computing and Data Science Training for Materials Innovation, Discovery, AnalyticS (MIDAS)

Search

[About NRT-MIDAS](#)

[NRT MIDAS Team](#)

[Trainee Experience](#)

[Courses for Trainees](#)

[How to Apply?](#)

[Our External Partners](#)

[News & Events](#)

About NRT-MIDAS

This **Computing and Data Science Training for Materials Innovation, Discovery, and AnalyticS (NRT-MIDAS)** is a new traineeship for doctoral students in Computer Information Sciences, Electrical and Computing Engineering, Chemical Engineering, Materials Science and Engineering, Biomedical Engineering, and Chemistry. In this traineeship students will learn to use **high performance computing** and **data science** to discover, innovate, and analyze new synthetic and biologically relevant **polymeric**

Search this site:

Search

Interdisciplinary traineeship for doctoral students

- For **admitted 1st year doctoral students** in UD Chemical Engineering (CBE), UD Materials Science & Engineering (MSEG), UD Computer Information Sciences (CIS), UD Electrical & Computing Engineering (ECE) and DSU Chemistry (CHEM)
- Research themes combine to different extents **high-performance computing (HPC)**, **data science (DS)**, and **soft materials (mostly polymers)**
- **NRT traineeship fits in the timeline of the individual UD graduate programs**

NRT Trainees – 1st cohort

**Kayla
Hepler (UD)**



**Stephen
Kronenberger (UD)**



**Alison
Shapiro (UD)**



**Sean
Farrington (UD)**



**Destiny
King (DSU)**



**George
Kramarenko (UD)**



**Jamael
Ajah (UD)**



**Peter
Osazuwa (UD)**



**Ai Nin
Yang (UD)**



**Julian
Brown (DSU)**

NRT Trainees - 2nd cohort

Erik Anderson
(Chemical & Biomolecular
Engineering UD)



Shweta Burgula
(Chemical & Biomolecular
Engineering UD)



Jamie Holmes
(Chemistry DSU)



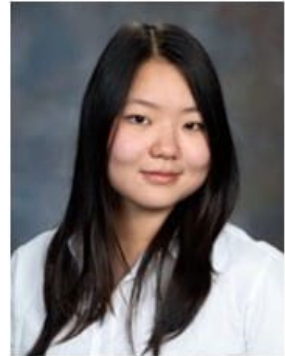
Kelsey Koutsoukos
(Materials Science &
Engineering UD)



Justin Labombard
(Electrical & Computer
Engineering UD)



Sonia Li
(Chemical & Biomolecular
Engineering UD)



Juliana Nam
(Chemical & Biomolecular
Engineering UD)



**Ana Maria
Mosquera Rodriguez**
(Materials Science &
Engineering UD)



Jay Shah
(Chemical & Biomolecular
Engineering UD)



Tasia Walker
(Chemistry DSU)

Interdisciplinary traineeship for doctoral students

- **NRT traineeship augments the experiences** that PhD students have beyond what they experience in their own graduate programs.
 - Funded NRT trainees get **faculty co-advisors (assigned by the NRT)** with expertise complementary to the expertise of their primary faculty advisor
 - NRT trainees participate in NRT **industry internship** or **teaching certificate program (mandatory for funded trainees)**
 - All NRT trainees participate in regular **community hours** that include networking events, technical talks by experts, & professional skills workshops
 - All NRT trainees plan & execute **community/public outreach** activities

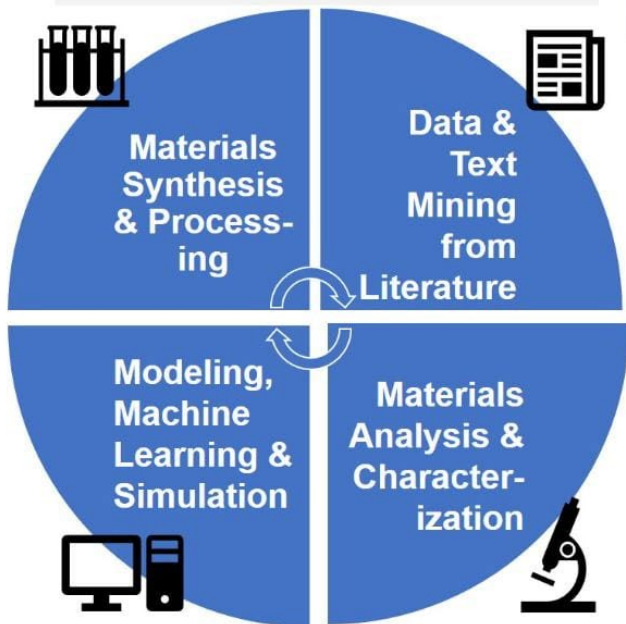
NRT MIDAS traineeship timeline (Year 1)

- **Fall Before Year 1 in NRT program**
 - NRT trainees selected in mid-December
- **Year 1 of NRT program - Winter & Spring**
 - NRT trainees continue to take their PhD **core & elective courses** in their respective departments
 - NRT trainees start their **research** (same timeline as other non-NRT students in your departments)
 - NRT trainees attend **NRT community hours** (workshops, talks, RCR training)
- **Year 1 of NRT program- Summer**
 - **Community outreach:** All NRT trainees pair up to plan and create activities for outreach to the public/local community – learn to effectively communicate their research work with public and non-scientist audience
- **Year 1 of NRT program - Fall**
 - Present a **poster on their ongoing thesis work** in one community hour.
 - By the end of Year 1 Fall, the NRT trainees should have completed at least **one technical elective in the primary discipline** and **one technical elective in secondary discipline**.

Professional Skills & Competencies



Technical Expertise



Convergent research under two thesis advisors with different research expertise



Core discipline courses and interdisciplinary (HPC, DS & MAT) electives



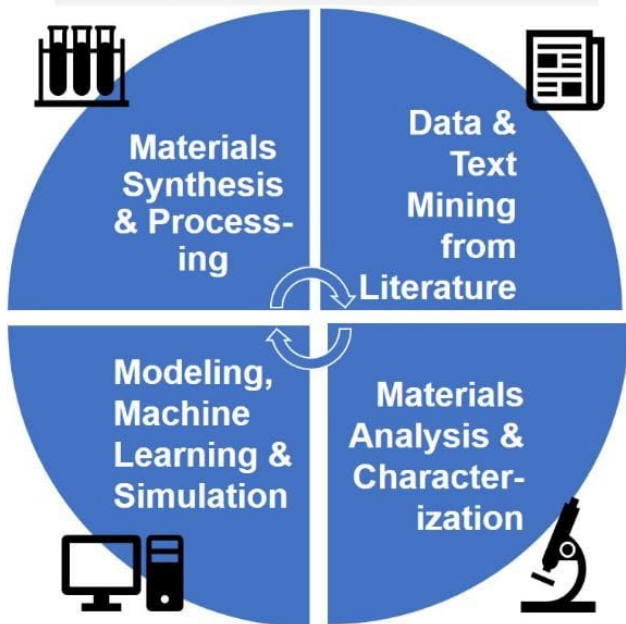
Career counseling with experts from academia, national lab, industry, patent law, science policy, etc.



Professional Skills & Competencies



Technical Expertise



Convergent research under two thesis advisors with different research expertise



Core discipline courses and interdisciplinary (HPC, DS & MAT) electives



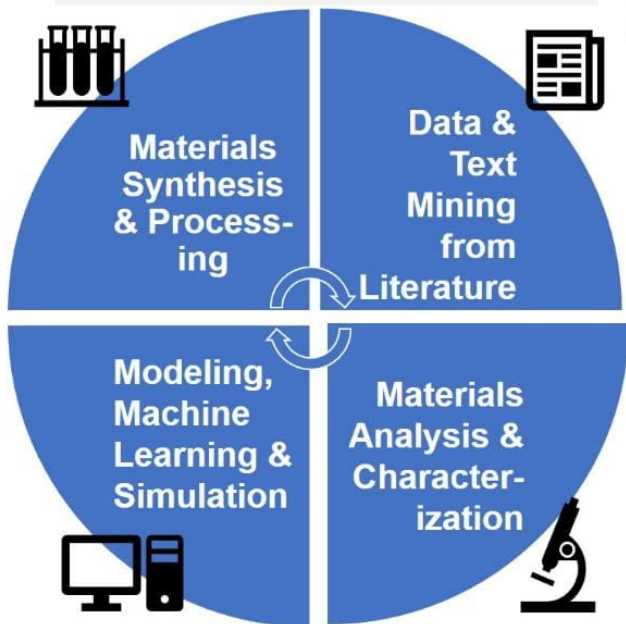
Career counseling with experts from academia, national lab, industry, patent law, science policy, etc.



Professional Skills & Competencies



Technical Expertise



Convergent research under two thesis advisors with different research expertise



Core discipline courses and interdisciplinary (HPC, DS & MAT) electives



Career counseling with experts from academia, national lab, industry, patent law, science policy, etc.

NRT community activities – throughout the traineeship

Fall & Spring NRT Community Hours

Professional workshops

- RCR (Responsible Conduct in Research)
- Diversity, Equity, Inclusion & Respect (DEIR)
- Ethics in Data Science
- Effective Communications

Technical talks

- Speakers from Industry, Academia & National Lab
- NRT Trainees' poster presentations

NRT Community Gathering

UNIVERSITY OF DELAWARE

Spring 2022

NRT - MIDAS COMMUNITY HOURS



JANUARY 21, 2022
DR. ADAM FOLEY
UNIVERSITY OF DELAWARE
DIVERSITY, EQUITY, INCLUSION, & RESPECT WORKSHOP

FEBRUARY 4TH 2022
MS. MELISSA JURIST
UNIVERSITY OF DELAWARE
COLLEGE OF ENGINEERING SUMMER OUTREACH ACTIVITIES

FEBRUARY 18, 2022
NRT-MIDAS SUMMER OUTREACH ACTIVITIES TRAINEE DISCUSSION & SET UP

MARCH 4, 2022
PANEL DISCUSSION ON INTERDISCIPLINARY TRAINING & CO-ADVISED RESEARCH
DR. ARUSHI PRAKASH (AMAZON), MS. KATIE NELSON (CBI, UD), MR. PHILLIP TAYLOR (CBI, UD)

MARCH 18, 2022
DR. MICHAEL WEBB
PRINCETON UNIVERSITY
POLYMER DESIGN AT THE NEXUS OF SIMULATION AND MACHINE LEARNING

APRIL 8, 2022
DR. DEBRA AUDUS
NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY
ENABLING MACHINE LEARNING FOR POLYMER SCIENCE

APRIL 22, 2022
DR. ANDREW FERGUSON
UNIVERSITY OF CHICAGO
DATA-DRIVEN PROTEIN DESIGN

MAY 6, 2022
INDUSTRY SPEAKERS
COMPUTING & DATA SCIENCE IN CHEMICAL INDUSTRY R&D

For ZOOM LINK to these hybrid events please contact NRT program coordinator MS. JENN JOHNSTON at UDNRTMIDAS@GMAIL.COM

UNIVERSITY OF DELAWARE

Fall 2022

NRT - MIDAS COMMUNITY HOURS



SEPTEMBER 9TH, 2022
WELCOME BACK, NRT RECAP AND FUTURE PLANNING

SEPTEMBER 23RD, 2022
MS. JENNIFER JOHNSTON
UNIVERSITY OF DELAWARE
EFFECTIVE COMMUNICATIONS WORKSHOP

OCTOBER 7TH, 2022
NRT-MIDAS TRAINEES TECHNICAL PROJECT PRESENTATIONS

OCTOBER 21ST, 2022
DR. TYLER MARTIN (NIST) AND DR. AHMAD GHOBADI (P&G)
TECH TALK - COMPUTING AND DATA SCIENCE IN NATIONAL LAB AND CHEMICAL INDUSTRY

NOVEMBER 4TH, 2022
DR. TOM POWERS
UNIVERSITY OF DELAWARE
DATA SCIENCE ETHICS AS CONSTRAINTS AND AFFORDANCES

NOVEMBER 18TH, 2022
DR. JEFFREY TING
NANITE BIO
TECH TALK - PROFESSIONAL MOVE FROM CHEMICAL INDUSTRY TO START UP

DECEMBER 9TH, 2022
SEMESTER WRAP UP

For ZOOM LINK to these hybrid events please contact NRT program coordinator MS. JENN JOHNSTON at UDNRTMIDAS@GMAIL.COM

NRT MIDAS traineeship timeline (Year 2)

Year 2 of NRT program - Winter

- NRT trainees continue to do their **research** and **attend one NRT community event**

Year 2 of NRT program - Spring

- All NRT trainees enroll in a mandatory NRT course **CHEG/MSEG/CISC/ECEG**
Computing and Data Science for Soft Materials Innovation

Year 2 Spring - Interdisciplinary NRT course

NRT MIDAS trainees take CHEG/MSEG/CISC/ECEG *Computing and Data Science for Soft Materials Innovation* (after their primary discipline elective and secondary discipline elective)

Interdisciplinary group of graduate students work in teams of 3-4 with each team tackling one **project submitted by industry/ national lab using computing tools**

- Instructors teach - **molecular modeling and simulation, high performance computing, and machine learning** with emphasis towards application of these tools to soft materials problems.
- Students apply these computational tools to solve the industry or national lab problem throughout the semester
- Students also learn and practice collaborative teamwork, and oral + written communications training regularly; professional skills in interdisciplinary work environment

CHEG/CISC
***Computing and Data Science
for Soft Materials Innovation***



*Creative Technologies
Worldwide*



In Spring 2022

15 MS & PhD students

7 graduate students with computing
background

+

8 graduate students with soft materials
background

taught by

Arthi Jayaraman (Chem Eng., Mat Sci & Eng.)
Sunita Chandrasekaran (Comp. Sci)

Spring 2023

**Computing and Data Science
for Soft Materials Innovation**



In Spring 2023

MS & PhD students

4 graduate students with computing expertise

+

10 graduate students with experimental
expertise

taught by

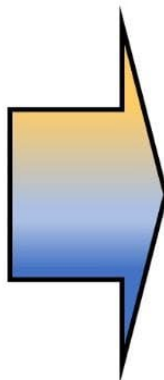
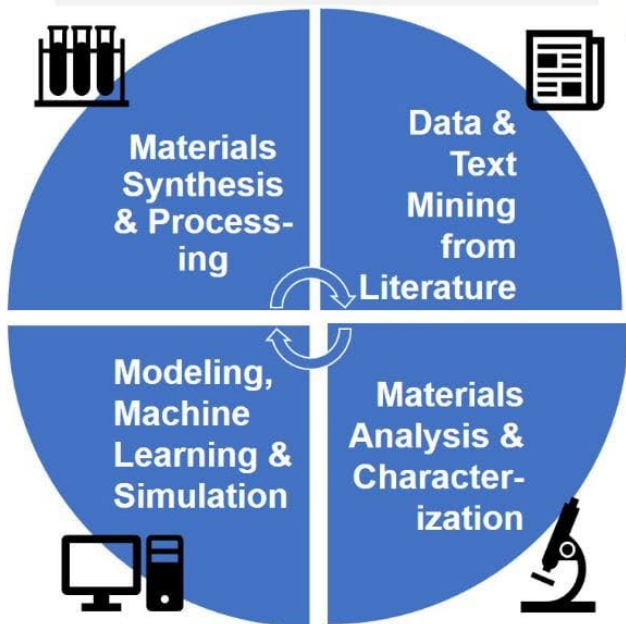
Arthi Jayaraman (Chem Eng., Mat Sci & Eng.)

Austin Brockmeier (Elec & Comp. Eng. and
Comp. Sci)

Professional Skills & Competencies



Technical Expertise



Convergent research under two thesis advisors with different research expertise

Core discipline courses and interdisciplinary (HPC, DS & MAT) electives

Career counseling with experts from academia, national lab, industry, patent law, science policy, etc.

NRT Hackathon Course: Interdisciplinary teams tackling problems from industry, academic/national lab

↓

Summer internship in industry/national lab OR summer teaching workshop & fall/spring teaching fellowship

NRT course in Spring

Internship or Teaching workshop in the summer

NRT MIDAS traineeship timeline (Year 2 continued)

Year 2 of NRT program - Summer

- For those interested in industry or national lab

Industry/National Lab Internship

For the entire summer, NRT trainees gain on-site experience with one of our partner companies who combine data science and computing for solving materials problems.

Mandatory for NRT-funded UD & DSU trainees interested in industry/national lab career

- For those interested in academia

2-part Teaching Certificate Program

Part 1 Effective teaching workshop by NRT core faculty in Y2 summer

Part 2 Teaching fellowship in core/elective/NRT course in Y2 Fall or Y3 Spring semester

Open to all NRT trainees and other students enrolled in UD & DSU

Year 2 of NRT program - Fall

- **NRT trainees** will present in the NRT community hour what they have learned from Summer internship/teaching certificate (mandatory for funded trainees); we also want to hear how they are combining technical and professional skills they have learned so far in their thesis work.

Successful completion of all of the above NRT training elements will earn you a

**University of Delaware's Graduate Certificate in
Computing and Data Science for Soft Materials**

This certificate program was proposed by Prof. Arthi Jayaraman & Ms. Jennifer Johnston.

*It has now been approved (after multiple rounds of reviews and interviews)
by University of Delaware to be effective Fall 2023!*

How and when to apply to the NRT?

- Go to <https://sites.udel.edu/midas-nrt> and click on “**How to apply**” in the menu
 - Has all the relevant information – who can apply, how to apply, selection process
- A google form + information on what is needed before you fill the google form
 - This year’s deadline **November 30th 2022, 5pm**
- Selection process will take place December 1 – December 15
 - Alignment in thesis topics with NRT research themes, CV, personal statement
 - Short interview (virtual/in person) of finalists before final list of trainees are selected

NRT decision letters

- Final decision that every applicant will get will inform them if they have been
 - Selected as a “NRT Trainee funded by NRT grant” for 2 years and then by their primary advisor
 - Selected as “NRT Trainee, not funded by NRT grant” (funded by primary advisor through out)
 - Not selected for NRT program

Trainees funded by NRT

- **2-3 (UD) + 1-2 (DSU) domestic students** (US citizen, green card holder)
 - NRT grant provides **2 years of stipend + tuition covered** (Jan AY1 through December AY3) **travel support** (~\$500 per trainee) once;

OR 1-2 International students

 - Will receive **1 semester of tuition + stipend** from Univ. funds + **travel support** (\$500 once)s
- Must have an assigned **primary advisor** who will support the trainee outside of any NRT/COE funding
- **2-yr funded trainees will have secondary advisor will be assigned by NRT team**
 - will bring in complementary expertise to that of primary advisor and work with the trainee and primary advisor in IDTP preparation, mentoring, & research direction
- These trainees are expected to do an internship in industry OR teaching certificate program

Trainee not funded by NRT grant

- ~4-5 International or domestic students who are interested in participating in this program
 - Trainees should have other sources of funding (e.g., primary advisor's grant supports them or the trainee's department TA-ship, etc.)
 - Trainees' primary advisor or source of funding should approve the trainee's participation in the training elements at time of selection
- Trainee commits to (selected) technical and professional training elements (designed to fit well within graduate program timeline)
- NRT grant/COE funds will provide travel support (\$500 per trainee) once
- Access to all professional workshops (including teaching certificate program), other networking opportunities
- Industry internships will be possible only if positions available

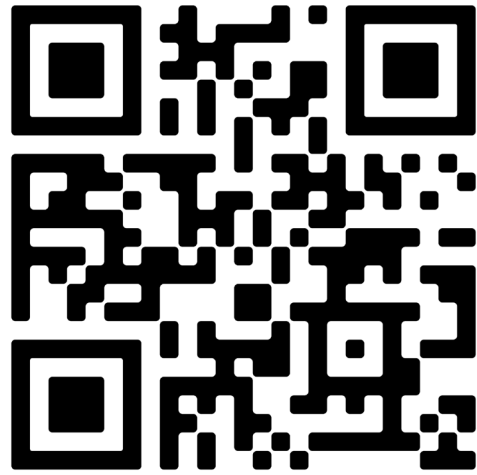
Frequently asked questions

- **I am an MS degree student at UD. Is the NRT program only for students in the PhD program?**
 - This NRT program is designed for **funding PhD students in their 1st year.**
 - **MS students can participate in all or any of the NRT elements and apply for the Graduate certificate!**
- **Will I have to select a secondary advisor before applying?**
 - No, **those who are funded (for 2 years) by the NRT program will be assigned secondary advisor by the NRT program**; goal to assign someone with expertise different but complementary to primary advisor expertise so the trainee receives combined computing/data science & soft materials advising
 - Unfunded NRT trainees will not get an assigned co-advisor.
- **Do I have to take more courses than expected from my grad program?**
 - **You only do as many electives as your grad program expects.** All that the **NRT program expects you to do is select those electives with a purpose to bring interdisciplinarity in your training**
 - 1 elective of your choice on *computing* (e.g., molecular modeling & simulations, Intro or advanced machine learning courses, GPU computing course),
 - 1 elective of your choice on *soft materials* (e.g., polymers elective for CBE/MSEG students or molecular modeling for soft materials for CS students)
 - Mandatory Spring Y2 – NRT ‘hackathon-style’ course “*Computing and data science for soft materials innovation*”

Frequently asked questions

- **I am an international student. Am I allowed to participate in this NRT program? Can I apply?**
 - **Yes**, an international student can be part of the NRT program. You cannot receive any financial support from the NSF NRT grant (NSF rules).
 - We have an additional pot of money from college of engineering to support international student NRT trainee travel (for unfunded NRT trainees) or 1 semester of stipend & tuition (for funded NRT trainee who is an international student)
- **Will I get a special degree or certificate?**
 - Your degree will be the same as what you would get from your UD grad program
 - Upon successful completion of expected NRT training elements, you can also receive a graduate certificate from UD Graduate College!
- **Who supports me financially after my NRT funding runs out (a question from NRT funded trainees)?**
 - Your primary advisor (research support) or your department (TA support)

**NRT-MIDAS Graduate
Traineeship**



SCAN ME