HITS 2020 June 1-3 and 24, 2020
Virtual

Vision & Goals

Modern life science techniques are increasingly utilizing automation and miniaturization to test numerous samples or conditions simultaneously. High-throughput (HT) approaches include massively parallel sequencing of DNA, synthesis of nucleic acids and peptides, automated microscopy, microfluidics for single-cell analyses, small molecule screening using robotics, and genome-scale phenotypic characterization using CRISPR/Cas9 gene-editing technologies. These approaches produce a wealth of results, often labeled 'big data.' However, there are limited educational case studies that address realistic HT approaches using authentic data. Well-designed broadly accessible educational case studies focusing on HT approaches and using original datasets empower students to learn current approaches and exercise quantitative reasoning that are critical for today's workforce.

We launched the NSF-funded High-throughput Discovery Science & Inquiry-based Case Studies for Today's Students (HITS) Research Coordination Network to address this gap. HITS brings together interdisciplinary groups of HT researchers and instructors to **produce realistic HT case studies that can be implemented in a variety of courses, allowing students to analyze authentic data and learn valuable quantitative skills.** Since 2018, twenty-one faculty Case Fellows, numerous case study experts, and HT researchers from across the country have formed interdisciplinary groups to design, implement, and improve HT case studies. Using the online QUBES platform (**go.ncsu.edu/HITS**), groups have created novel cases for broad curricula. This interactive workshop has the primary objective of **raising awareness of the importance of and opportunities offered by HT case studies.**

Participants in this interactive session will list HT approaches and open-access resources that can be used to create new HT cases or adapt existing HITS cases. Participants will examine cases and identify ways to promote awareness of HT in a variety of different courses and institutions by focusing on the HITS Learning Outcome Framework. Participants will then be able to write learning outcomes suitable for new HT cases for their own courses. Participants will be able to list specific examples of ways to infuse responsible conduct of research into cases and promote equity and broad accessibility of materials, datasets, and discussions.

This interactive workshop aims to empower *all* case users to incorporate HT approaches into their courses and engage students in the creation and improvement of HT cases. Please note

that **sessions will be recorded** for members of the HITS group unable to attend, but the recording will be only available to those within our community.

We look forward to your contributions to the HITS group and the broader undergraduate education community as we explore the possibilities of high-throughput discovery science!

Expectations

Participation in the **3-day workshop June 1-3rd** virtually during synchronous and asynchronous sessions is expected. You will learn about high-throughput approaches and case studies from nationally recognized experts. Then, you will work with researchers, other faculty, and authentic data sets **to produce an educational case study for your students**. After the workshop, the activities will continue virtually through the QUBES online web portal with monthly check-ins. Groups will present about the case they are developing on **Wednesday, June 24th in another synchronous Zoom session.** You will continue to work on your case and offer it in a course in the fall 2020-spring 2021 academic year. This year's groups will also present their results at our fourth workshop in 2021 on a different campus. **We also expect our fellows to disseminate results in publications (NCCSTS, CourseSource, etc.) and poster sessions** (including at the HITS meeting) so that others can benefit from the resources the network creates.

Overview

<table>
<tr><td colspan="3" align="center">Overview of the 2020 HITS Workshop</td></tr>
<tr><th>Scientific Sessions</th><th>Case Study Sessions</th><th>Case Study Development</th></tr>
<tr>
<td>Speakers include high-throughput (HT) experts from industry, government, and academia.</td>
<td>Speakers include experienced case study users who have created and implemented case studies in college classrooms.</td>
<td>Groups will present their plans for their case studies and provide updates. Groups will share their goals and timelines on QUBES for accountability.</td>
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<tr>
<td>Attendees include educators and case fellows, HT experts, and HT researchers.</td>
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<tr>
<td>Attendees will learn about HT approaches. Collaborations are expected to emerge through interactions at this small but focused meeting.</td>
<td>Attendees will learn the value of well-designed educational case studies. Case fellows will provide updates on their cases and mentor new cohort members.</td>
<td>Groups will work to design and write new case studies using HT approaches/ datasets that can be implemented in college classrooms.</td>
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Schedule

Week of May 25, 2020
Pre-conference Work

1. Please complete your 'Virtual Business Card'. Create a slide for your card.
2. Watch the session "Automatic nuclear labeling in tissue cleared brain microscopy images"(43 min) by Jason Stein, Guorong Wu, and Carolyn McCormick. We will discuss this session Monday with the speakers. Their website is: https://www.nucleininja.org/
3. Please watch Dr. Davida Smyth's pre-assignment video (17 min) and see https://davidasmyth.net/microbiome-of-urban-spaces.
4. Drs. Nic Vega and Kate O'Toole pre-assignment:
   Active learning, especially Case-Based Learning, takes time to allow students to build concepts for themselves through guided and authentic inquiry. Class time is precious, but many educators will agree that depth of understanding is better than breadth of knowledge. This investment of class time in Case-Based Learning is best used to focus on difficult and important core concepts.
   HOMEWORK: Brainstorm Core Learning GOALS
   - What are the most important concepts that students need to take away from your course?
   - What are the most difficult concepts for you to teach or that your students always struggle to learn?

Monday, June 1, 2020.
Day 1: High-throughput (HT) Discovery Science.

Times/Place	Sessions

9:00-10:30 am
virtual cafe
	***Welcome to HITS!* Overview of HITS and goals**
	- Bring a coffee and a snack
	- Introductions - show and tell (pet, project, person, etc.) and why you are here
	   - Send one slide/info - same template. **Virtual business cards**
	- Goals of HITS - **Carlos Goller/Sabrina R.**
	   - Educate our new fellows on HT approaches
	   - Update, adapt & publish existing cases
	   - Create new cases
	   - Form new groups & recruit individuals to existing groups

10:30-11:00 am	Break
11:00-12:00 Synchronous Discussion	**"Practical on manual labeling of tissue cleared images to train automated algorithms"** Dr. Jason Stein, Dr. Guorong Wu, Carolyn McCormick, and Dr. Minjeong Kim *Watch the pre-conference work session #2 above and bring your questions to participate actively in this discussion*
Synchronous	**Reflection & Wrap-up for the day** - What did you learn today that you hope to use in a classroom? - What did you learn today that you hope to use in your research?

Tuesday, June 2, 2020.
Day 2: HT Case Studies.

Times/Place	Sessions
9:00-10:00 am	**"When the problems get real! Problem-driven research experiences with microbiomes"** Dr. Davida Smyth New School, SENCER, PI ResNet RCN - Microbiome CUREs
10:00-10:30 am	Break
10:30-11:30 am	**Case updates from 2018 and 2019 Case Fellows** ● "Genetic disease: Toy Datasets to Deep Sequencing"" Alfred Simkin, Elon University ● "Single Cell Insights into Cancer Transcriptomes" Amanda Solem (Hastings), Kathleen McAdams, Adam Kleinschmit (DBQ), Melissa Eslinger (Westpoint), Leigh Ann Samsa (NCSU).
Synchronous using group chat	**Wrap-up for the day and group assignments** - Random Break rooms: What did you learn today? What do you hope to use in your classroom? - Brainstorm case scenarios and datasets

Wednesday, June 3, 2020.
Day 3: Case Study Development.

Times/Place	Sessions
9:00-10:00 am	**"Experimental big data as a case study tool."** Drs. Kate O'Toole and Nic Vega: Case Study Expert session Biology Department, Emory University, Atlanta, GA. Worksheet in Shared Resources Folder.
10:00-10:30 am	Break
Synchronous	**Group Zoom photograph!**
	Guidelines for presentations of group projects and future milestones - **Facilitators holding office hours** - **Come back in a couple of weeks for presentations**
Virtual	**Dedicated time to work in groups to delineate the goals of their cases and identify data sets**.
Virtual	**Wrap up** - Demo of QUBES support network. - **Sam Donovan** - Set group timelines and goals (GoogleDoc)

Wednesday, June 24, 2020. 9:00 am - 12 noon. Group Presentations

When: Jun 24, 2020 09:00 AM Eastern Time (US and Canada)

Guidelines for Group Case Study Presentations

As we work through our conference, a major goal is to connect you with a team to create, modify, and/or publish your case study. You will work with your group long term to create and disseminate your case. The first step in this journey is to create a brief (<10 min) presentation of your case for another synchronous HITS 2020 session on **Wednesday, June 24**.

Presentation time limits will depend on how many groups form during our conference. Your group should create a Google slide deck in our group presentation folder.

Your slide deck should include:
(1) **Title**
(2) **Group members** (names and contact information)
(3) **Hook for your case study narrative:** How will you get students engaged?
(4) **Dataset:** Description of the high-throughput data your case will use. Link if possible
(5) **Tools used**: open source Software, **Orange Data Mining**, Websites, etc. (**BreSeq** Allen Cell Explorer web-based tools, Microsoft Excel, R.
(6) **Learning Outcomes**: List the learning outcomes that are specific to your case. Integrate as many of the HITS Learning Outcomes as possible, and create your own.
(7) **Outline/Roadmap of your case**: How many class sessions will your case require? What will students be doing?
(8) **Timeline**: Identify milestones for getting your case into your classroom and for sharing your case with the broader public (NCCSTS, *CourseSource*, etc.). Who will contribute what by when?

Agenda

We will start with a brief overview at 9:00 am and then start with updates from the groups. While we will try to present in the order of group numbers, groups can volunteer to go first. Please make sure your presentation is in our shared folder.

Template for Thank You Letter

Dear [partner, children, friend, colleague, dean, department chair, or neighbor]:

I sincerely thank you for the time and resources you provided that allowed me to participate in the HITS Summer 2020 virtual workshop on June 1-3. I realize the time commitment required to contribute to the discussions meaningfully placed additional tasks on your plate in a time of high-stress and uncertainty. Thank you for your patience and support that allowed me to take part in this professional development opportunity.

Sincerely,

[Your name]

Feedback!

We want to hear from everyone! Please contribute to discussions during the Zoom sessions or using our HITS QUBES forum.

Standards of Behavior for HITS Participants

The HITS summer workshop is committed to fostering a culture that encourages and supports the full participation of persons of all identities and from all backgrounds. We seek to promote a safe, brave, and productive Institute environment that allows for open dialogue and the exchange of ideas and is free of harassment and aggression. All participants are expected to treat others with respect and consideration, upholding the highest standards of integrity and professional ethics. We do not tolerate abusive or intimidating language or behavior. HITS reserves the right to require anyone whom we find violates these standards to leave the workshop and to take other corrective actions we believe are appropriate.

HITS does not permit intimidation or coercion of or by meeting attendees in any form. Examples of prohibited intimidation or coercion include but are not limited to:

　　• Verbal harassment, such as epithets, derogatory statements, slurs, comments or jokes related to a protected characteristic;
　　• Sexual harassment, such as offensive, unwelcome sexual advances, invitations with the purpose or effect of substantially interfering with an individual's participation in the meeting, offensive, unwelcome conduct or comments of a sexual nature;
　　• Physical harassment, such as assault or inappropriate physical contact;

HITS expects Institute participants to communicate respectfully at all times. HITS will take seriously and address a recipient's perception of aggression in all cases, including situations where the person engaging in the behavior may not have intended it as such.

If you believe you are the target of aggression while attending the Summer HITS Workshop, or if you are concerned that someone else at the Workshop has been targeted in this way, please report this as soon as possible to any of the HITS staff or using this anonymous feedback **link**.

　　　　　Thank you for honoring the HITS Standards of Behavior Policy.

We appreciate your comments and reflection on our HITS Standards of Behavior Policy. Please provide constructive feedback so we can improve our policy and institute.
Adapted from: Standards of Behavior for Project Kaleidoscope and
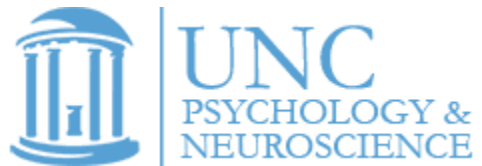STEM Leadership Institute. Group: Cultivating Scientific Curiosity ~ Code of Conduct

Zoom Instructions

Instructions for Joining a Meeting

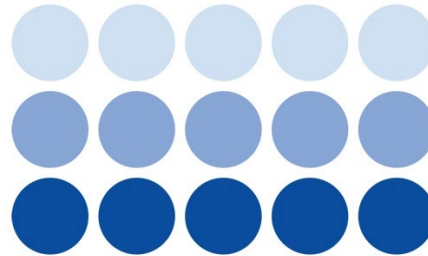[Joining a Meeting](#)

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