

# SUMMER INSTITUTE in TEACHING SCIENCE



SITS 2020 | MAY 18 – JULY 24



## SITS and COVID-19

The COVID-19 pandemic has dramatically altered our lives this summer, as it probably has yours. With the campus shut down at the start of the summer, and everyone working from home, SITS had to go online. All the sessions were held in a virtual format using Microsoft Teams.

As a result, this newsletter is a little short on photographs. We were thankful for the technology that made it possible for us to work together and maintain a sense of community in spite of the challenges. We hope that we made the best of a difficult experience, but it was not the same not being able

to gather together for in-person fellowship and discussion.

We were also reminded that face-to-face instruction is at the heart of what we do. Unlike many other colleges and universities this fall, BJU cannot simply take the BJU Experience online. This is true for the out-of-class aspects of BJU, such as the discipleship groups and chapel. But this is also true for the in-class experience, where it is very difficult to replace the interactive discussions that take place in class. Of course lab experiences compound the problem as well. (continued on page 3)

## RIU

Although SITS moved online, the summer Research Immersion for Undergraduates programs did not.

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## Health Sciences

Big changes on campus in the health sciences area. Read about the new building and the excitement over the growth in this area.

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## Comments

Read how the faculty used their time this summer and what they took away from this year's online version of the summer SITS program.

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## RIU

The RIU (Research Immersion for Undergraduates) programs by nature are hands-on laboratory experiences. COVID-19 or not, they are nearly impossible to conduct online. So we were pleased to be able to offer our three RIU programs this summer as planned on campus. In fact, these were the first students to return to campus for an academic experience after the school shut down in March. Only a small number of students were involved, and this gave us a chance to practice some of the protocols that will be necessary this fall as the entire student body plans to come back to campus. Of course, science students already



*RIU programs operated as scheduled with students live on campus, in spite of COVID-19.*

have some experience with PPE in the lab, as well as a scientific perspective on the risks and challenges, so they were well equipped to do this.

### ENGINEERING

Four engineering and computer science students continued our ongoing research into unmanned vehicles. This year's program was funded by a DoD grant rather than the Science and Engineering Endowment, freeing up money for the other two RIU programs.

Students continued development of our experimental vehicle Bruin-3, particularly working on the software. The current grant is to develop training materials for the DoD robotics software, and this year's RIU students were able to test those

training materials as they learned about the software.

### CANCER RESEARCH

The students in this summer's biology RIU program located in the cancer research lab continued our investigation of a component in almonds that is cytotoxic to at least some cancer cell lines (*in vitro*) but not a normal cell line. They investigated what cell death molecular pathway is being triggered by this cytotoxic component.

Alondra Arredondo, William Epperson, Alexandra Sigmon, and Rachel Westphal were the chosen ones for the program, and Jonathan Batchelder joined the team "on his own dime," so to speak, for the experience. Together they have focused on the question using a variety of commercially available assay kits. Tentatively, it would

appear that the almonds trigger an apoptotic pathway and not necrosis or cell stasis. The identity of the cytotoxic component is not known, but this summer's research suggests it is not a flavonoid, but possibly a product of flavonoid degradation.

### CHEMISTRY

Daniel Moats and Jason Sampson, both Biochemistry and Molecular Biology seniors, participated in the 2020 Chemistry RIU. Their target was the synthesis and characterization of the small molecule hydroxybupropion which is an antidepressant and a known metabolite of the better known antidepressant Wellbutrin. This work was done in collaboration with Cayman Chemical. Daniel and Jason were able to build their lab skills while working on professional development through their collaboration.



There may be need to take part or all of our classroom education online again this fall, as we did in March. To that end, the online SITS experience was helpful in teaching us how to maximize the online experience and make the most of the limitations.

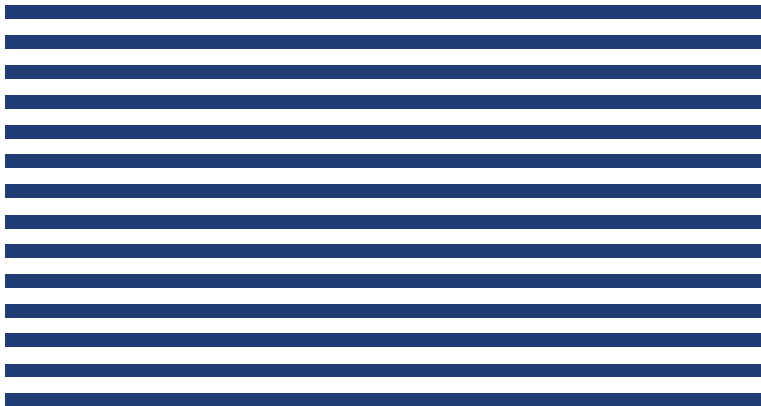
This has led to some detailed discussions of which parts of our education could possibly be taken online. We believe that with wise course design we can replicate some of what goes on in the classroom. The centerpiece of this effort is our work on Essential Science, the core science literacy class that most BJU students take. The administration would like this class to be offered online, but it is taking months of discussion and preparation, including development of some new online tools and techniques, to make this feasible.

One technique that is a centerpiece of what we do in class is Socratic dialog. Socratic dialog involves asking lots of questions, sequences of questions, that lead a student in his or her thinking. It means that you reply to wrong answers with follow-up questions. You answer students' questions with probing questions of your own. Questions are a "power tool" to force students to think. But how do you do that in an online class?

We are exploring two tools. One is online discussions with the teacher. In many online classes, discussions are with peers. These do not replicate the dialog a student needs to have with the teacher. So we are exploring the use of online asynchronous discussions between students and teachers.

Our second tool is an online Socratic dialog tool. To the student it feels much like an online chat through a sequence of guided questions. The questions are carefully preplanned and designed by the teacher to lead the students down a line of thinking and respond to their misconceptions. Unlike many chat bots, we are not attempting to use "artificial intelligence" or natural language processing. We are highly skeptical of the capabilities of such systems. We are instead leveraging "faculty intelligence" to pre-plan whole trees of question sequences.

These question sequences, a kind of "smart quiz," take a long time to develop but seem to be effective in replacing some of the dialog that happens in class.



## Health Sciences

Growth of the various health professions programs led the university to separate them into a separate school, the new School of Health Professions. We are sad to see some of our former Health Sciences colleagues now disconnected from the Division of Natural Science, but we continue to work together to provide the science instruction for those programs, and we rejoice with them over their new building, and over the space that is now freed up in our building. The photo above is an architect's rendering of the remodeled Mack Building.

### The School of Health Professions

#### Exercise and Sports Science

- Personal Training
- Kinesiology
- Sport Management

#### Health Sciences

- Communication Disorders
- Health Sciences
  - Health Care Admin
  - Nutrition
  - Pre-pharmacy
  - Pre-physician Assist
- Public Health/Global Health
- Premed/PreDent

#### Nursing

- BSN, RN to BSN

### Health Sciences Faculty

The following faculty members have moved to the School of Health Professions and are no longer in our division. We still consider them as colleagues! And they are still able to participate in SITS to develop courses they still teach for the Division of Natural Science.

- Jessica Minor
- Amy Hicks
- Marc Chetta
- Melanie Schell

Of course the opposite happens as well; we have Natural Science faculty who teach Health Science classes.

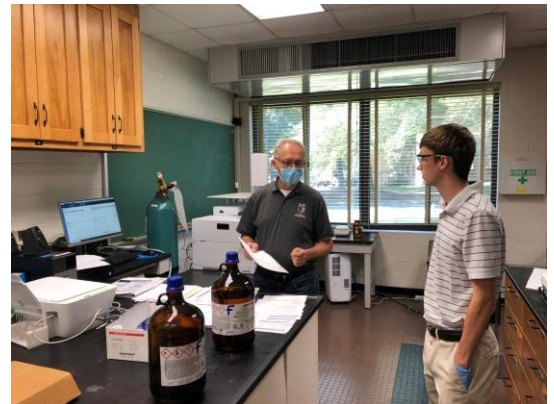
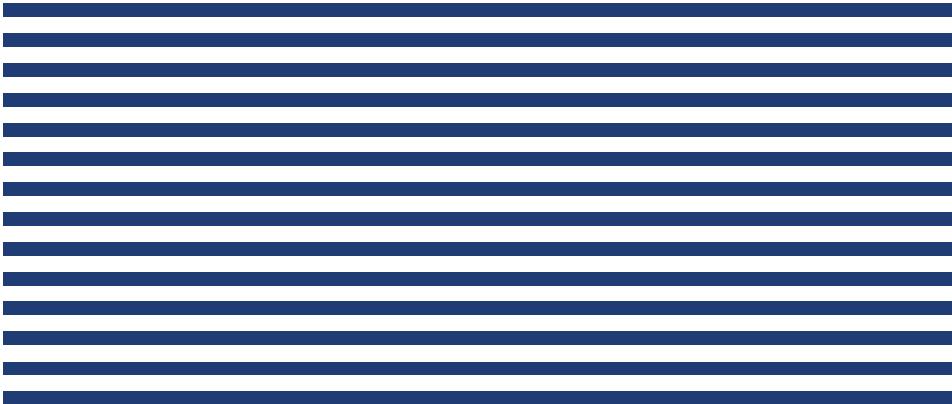




## Value

Here are some comments from this year's SITS participants.

- I'm so thankful we still had SITS despite what was clearly in style at the time –cancelling everything *just because*. Given that, it's hard to complain about the online format, though it clearly had its limitations. I was still able to accomplish so much this summer, including designing two new genetics labs, doing a bit of research and writing, and teaching a bunch of sessions. So it was still a success.
- Despite the unusual circumstances this year, I felt like SITS was largely as effective as it has been in past years. I did miss the sense of community, and the pleasantly weird side conversations that challenged my thinking in other ways, but by and large it was still highly profitable for my sense of what I am doing as a teacher, and where I am going, or at least should be going. I love and respect my faculty peers, and I always enjoy participating in conversations with them about how we can improve our teaching.



- Meeting online for SITS this year was not ideal, but it was beneficial in stretching our teaching skills. I was able to see different approaches like 'pair and share' and 'polling' used by fellow teachers as they taught Track 2 sessions online. Seeing and using these teaching strategies virtually was a great way to build my teaching toolbox and provided some good practice and familiarity with using these tools. I am even planning on using some of these tools, like the Socratic Tutor, in my regular, in-person class.
- Track 2 has significantly shaped how I teach, opening up ideas and approaches that will help students reach understanding. The idea of "answers stop a student thinking" has prompted me to construct a course built around questions.
- The other part that I have been working on is the environment. I have seen the importance of building a critical learning environment. I have been working on incorporating activities and questions that will help make the principle approach natural in my classroom.

