



SITS 2025

# Summer Institute in Teaching Science

Annual Newsletter

2025

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## SITS is *Essential* (Not Tangential) to Our Unique Mission

by **Derrick Glasco**, SITS Director



In preparing for my new role as SITS Director, I've often reflected on my own SITS experience and the many changes I've seen in the program over the years. Having just

completed my 15th SITS—now entering my 15th year in the classroom—it's easy to say that SITS has been the primary, indispensable catalyst for my development as a teacher. But now, do I *still* need ten full weeks each summer to focus on improving something I've already been doing for 15 years? *Absolutely.*

Everyone knows that being a college student is hard, but (in my opinion) being a college professor is *harder*. And doing so at a place like BJU with such a unique and important mission? An even bigger challenge!

To demonstrate just how essential SITS is for natural science and engineering faculty to effectively carry out BJU's mission, let's compare some priorities of the professoriate at BJU vs. a "Big Secular Research University":

At **BJU**, science and engineering faculty must be **at the top of their game** in four very different areas:

1. Maintaining a leading-edge knowledge of their fields. (*Can you think of anything that changes faster than STEM? The pace is ruthless!*)
2. Demonstrating continuous improvement in their teaching effectiveness amongst a rapidly changing student body.
3. Possessing a deep understanding of both the evolutionary (materialistic) *and* creation (biblical) worldviews – both philosophically and scientifically.
4. Effectively carrying out biblical worldview shaping through intentional course design and mentoring of their students.

But at **Big Secular Research University (BSRU)**, **#1** is king! To be deemed successful, most faculty would seldom (if ever) need to apply themselves to **#2–4**, even if we flipped the terms for **#4** to "atheistic worldview shaping."

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### A Tale of Two Engineers: Lab Track Updates for 2025

Lab Track participants share their progress on **page 2**.

### In the Hot Seat: Worldview Analysis of *Super Courses*

**David McKinney** reflects on this year's biblical worldview emphasis in SITS on **page 3**.

### Research Immersion for Undergraduates

Numerous students enjoyed the opportunity to conduct RIU-funded research on campus this summer. See what they were up to on **pages 4-5**.

At **BSRU**, evolutionary thinking and worldly values run smoothly in the background. Absent is the pressure to constantly push back against the relentless influence of secular thinking.

And surprise! There's actually a **#5**: If we are to best prepare our students, BJU science and engineering faculty must provide immersive research opportunities, at least at the program level. But it's these same faculty

already committed to **#1–4** that must create and maintain those opportunities.

That's why we need SITS! It's **vital**. I couldn't imagine any of my past 15 summers without it. Those treasured 10 weeks provide a rewarding balance of intellectual upkeep, collaboration with peers, feedback on course design—and lately for me, the worthwhile challenge of training other teachers—all without the distracting financial pressure to pursue off-campus summer work.

In recent years, the Science & Engineering Endowment has *also* been able to fund **Research Immersion for Undergraduates (RIU)** programs in four different disciplines, helping us to better fulfill **#5**.

This year's newsletter may be a bit longer than usual, but we have much to say! Just know that us "SITSians" are grateful to the Lord—and to you, our supporters and donors—for providing this opportunity, now and into the future! ♦♦♦

## A Tale of Two Engineers: Lab Track Updates for 2025

Once SITS participants complete our core curriculum (Tracks 1–3) in their first three summers, they "graduate" and become eligible for a different experience—**Lab Track**. Almost all of us teach labs every semester, and some actually spend *most* of their time in the lab! So, it just makes sense to have a curriculum intentionally designed to apply SITS principles to lab design.

Lab Track is focused on creating what we call **deep learning labs**. This is quite different than the cookbook-style (shallow learning) labs many of us have experienced. There, the focus is almost exclusively on skill development. In deep learning labs, critical thinking, experimental design, robust data analysis, and clear communication of results are central. Students develop many of the same lab skills, but with purpose and intent as they grow in their ability to think like scientists. Or should I say...**engineers**.

That's what both Lab Track participants were this year. Here's what they were up to, in their own words (*because trust me, you don't want to hear a biologist try to explain it*):

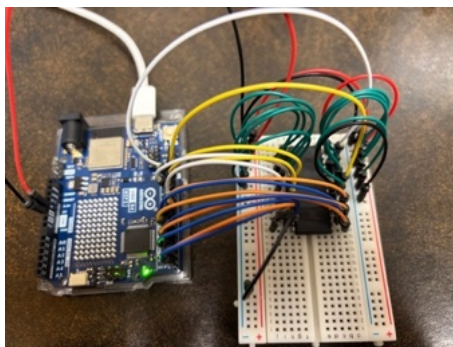
### Timothy Anglea

Ele 404: Microprocessor Interfacing

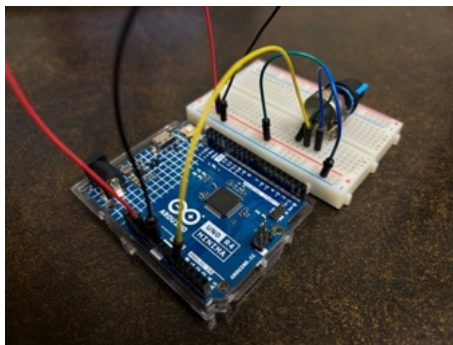


This summer, I worked to revise my target course, Ele 404: Microprocessor Interfacing, to use a newer microcontroller on the Arduino UNO R4 development board. This

change required a complete overhaul of all course materials and assignments, as many



specifics are tied to the details of the microcontroller. However, I gave special emphasis to updating the laboratory portion of the course, where students explore and experiment with the features and peripherals available for the microcontroller. I want the students to develop a deep understanding of microcontroller design so that they are well prepared to integrate both hardware and software in solving future engineering problems. ♦♦♦



### James Collins

Eng 408: Linear Control Systems



My focus this summer was the Linear Control Systems labs. This course is a senior level class with several abstract concepts and the students have had some trouble in the

past relating the complex and lengthy labs to the course lectures. I carried out the process of modifying, with an attempt at simplifying and clarifying, the instructions and procedures of the labs to more easily allow for the connection to the lectures. My hope is that if the labs are not quite so challenging to accomplish, those conceptual connections will be more easily made. ♦♦♦



# In the Hot Seat: Worldview Analysis of *Super Courses*

by David McKinney



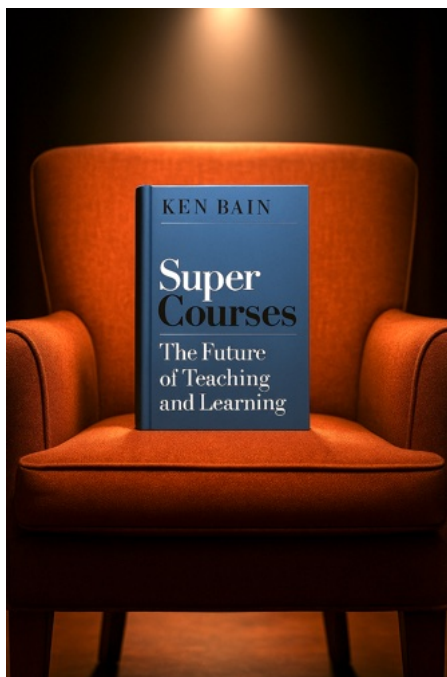
This year's SITS worldview sessions were conducted as roundtable discussions centered on the relationship between pedagogical methodology and the

worldview through which those methodologies were developed. Specifically, we wanted to explore how methods might carry implicit worldview assumptions at odds with our biblically focused mission, and how the use of such methods could be spiritually counterproductive even if nominally effective.

The book chosen as a starting point for these sessions was Ken Bain's *Super Courses: The Future of Teaching and Learning* (2022). Bain writes from the perspective of a secular humanist and presents the latest research on teaching and learning as definitive proof of the superiority of the teaching methods he espouses. For example, Bain argues from a materialist assumption about the nature of man, speaking of "ancient brain structures" and "foraging like animals" in the context of learning. Because of these realities, as he sees them, the methods he recommends are designed as externally shaping to conform to students' natural "evolved" human state, something Bain calls the *natural critical learning environment*. Because of his humanistic leanings, he suggests that some of the most important elements of pedagogy are giving students freedom and not passing judgment on student work, at least initially.

For us in SITS, the questions become as follows: How does habituating students to autonomy fit with a biblical view of submission to God and the constraints of the world God has made? and How does a de-emphasis on judgment of right and wrong mesh with the biblical view that there will be an accounting for every word, thought, and deed?

Specifically applied to pedagogy, does appealing to fallen human nature in the vein of, "You're a



beautiful person who's fine the way you are" fit well with a goal of being transformed from where you *were* to where you *need to be*, academically and spiritually?

Part of Bain's thrust is that students aren't motivated through teaching practices based on a deficient model of what it means to learn, and this seems to be a reasonable observation. However, Bain's solution is to covertly motivate students by appealing to

their personal pride. While a pedagogical method appealing to pride might work—even well—from a Biblical perspective this feels like a devil's bargain. Like the philosophy that "sex sells" in the marketing world, the price paid for the temporal gain is leveled against eternal accounts. What is more, **humility** seems to be a necessary component in learning deeply. At minimum, this requires 1) admitting that you *don't know*, and 2) that you must *submit to an authority* to practice thinking in an area before you can arrive at thinking well about it—and both of those before developing the maturity needed to think well and independently in any discipline. Some of the methods at the forefront of Bain's natural critical learning environment seem counterproductive to positive spiritual growth and deep learning, despite their claims to the contrary, because the core worldview beliefs that the methods pivot from are out of step with God's designs for man and the world.

As our four-week discussion concluded, I believe we gained clarity in critically evaluating the methods we consider and adopt in our own classrooms. There are many good approaches to teaching students, with not many "one-size-fits-all" approaches to pedagogy. Some parts of Bain's natural critical learning environment **aren't** contrary to our biblically centered goals. Certainly, there are better and worse approaches, but I think that the most valuable recognition

from our conversation was that effectiveness is hardly the only, or even the most important, criterion for use in the classroom. Consideration of the spiritual side effects of using secular approaches to teaching—approaches built off a secular misunderstanding of human nature—should be paramount in deciding what is appropriate for our own classrooms. ♦ ♦ ♦



# Research Immersion for Undergraduates

## *Updates from Physics, Engineering, and Chemistry*

### Physics RIU

update from **Nick Gothard**



This year, the Physics RIU supported two students—one Physics major and one Computer Science major. These students gained real-world experience in the

laboratory and in software development in support of ongoing projects. Physics major **Miguel Herrero** planned and executed a course of study directed at improving conductivity in lithium-iron-phosphate cathodes for use with solid state batteries. To make the materials better conductors, he employed ball milling to introduce carbon. Then, he consolidated materials by microwave processing, using a unique microwave resonant cavity (MRC). The effects of processing were characterized by electron microscopy and electrochemical impedance spectroscopy. A presentation is anticipated at the American Physical Society Meeting this Fall.



Computer Science student **Ryan Kuhn** contributed to the development of a GUI-based Python system capable of controlling multiple gas flow regulators and a pressure regulator for a microwave plasma chemical vapor deposition (MPCVD) system. This is a

major step in bringing the MPCVD system fully online. Both the MRC and the MPCVD are currently on loan from the US Air Force Research Laboratory. ♦♦♦

### Engineering RIU – Robot Team

update from **James Collins**



For the first three weeks of the summer, four students took part in the Robotics RIU. The main purpose of the RIU is to give students exposure in designing, programming

and working with robots. The aim is also to pass on the knowledge and skills to the next generation of students. This year we had one experienced robot programmer and three novices. The students primarily work on our university competition robot which is an autonomous navigation robot designed to participate in the Intelligent Ground Vehicle Competition (IGVC). We did not attend the competition this year, but it is a typical part of the robot team experience.



During spring break, one of our robot teams participated in the IEEE SouthEastCon Hardware Competition and placed 2nd in robot design and 3rd in competition performance out of about 50 teams.



Scan here for a neat video explaining the IEEE Mining Mayhem Competition rules!



Scan here to watch the BJU vs. Clemson match!



The summer cohort of students were privileged to attend a day of one of the world's major robotic conferences, ICRA – the International Conference on Robotics and Automation. This conference has about 7000 attendees and is hosted in a different international location each year. This year's conference was held in Atlanta, and as a faculty member it was very encouraging to see how much of an impact the conference had on the three students that were able to go. They absolutely loved seeing what was going on in the world of robotics.



The Robotics RIU is a vital component in giving our students dedicated time to learn and work on robotics. ♦♦♦

### Chemistry RIU

update from **Robert Lee**



In 2024, **Julia Chelli**, **Audrey Volmer**, and **Kathryn Waycaster**, senior biochemistry majors, completed their RIU project—Synthesis of AZ1 via Williamson Ether Synthesis and Reductive Amination—and successfully graduated in May 2025.

(Continued on page 5.)



Students and faculty from the Chemistry and Cancer Research RIUs, 2024.

This summer, **Abigail Foote**, junior chemistry major, synthesized Urolithin A via Ullmann Coupling; and **Evangeline Crabtree**, junior chemistry minor, synthesized Urolithin B Via a Hurtley Reaction. Both projects were in collaboration with **Paige Heiple**, a BJU alumnus who is a chemist at Cambrex.



In addition, **Bethany Carnell**, senior biochemistry major, completed an analytical study entitled, "The Effect of Aluminum Sulfate on Water Toxicity and a Comparison of Alternative Coagulants to Remove Phosphorus from Wastewater." This project was in collaboration with Renewable Water Resources (ReWa), where she served as a summer intern.

Each of these projects was presented to the SITS/RIU faculty in July. ♦♦♦



## What Did Participants Like About SITS 2025?



At the end of each summer, we ask faculty to provide detailed feedback on SITS from their perspectives, offer suggestions for improvement, and to share highlights. There are two things that *everyone* seems to like—valuable interactions with colleagues, and...well...**snacks**! We don't snack as often as you might think, but we do tend to take more pictures during those times!



Here's a sampling of comments we received from this year's participants:

"SITS provides the platform for us to think deeply about the 'why' of our courses and not just the mechanics of them...SITS is a tremendous help for new faculty as they develop their teaching abilities and tools."



"SITS specifically prepares me for helping students in the above areas by providing awareness of the situations that are out there, by giving examples from colleagues on how to address those situations, and by helping me weave well a worldview of wonderfully biblical proportions in my courses and pedagogy."

"Through SITS, I'm afforded time to assess my current classes and focus on improving different aspects of my courses. From creating tests, labs, and assessments to completely reworking a new course, SITS has given me the tools, knowledge, and confidence to accomplish these tasks."

"I believe the primary strength of SITS is the opportunity to get to know other faculty and learn from their knowledge and experience in teaching. Another strength of SITS is that it requires the faculty to be constantly improving in the teaching and explore the big ideas in their course."



"Discussions with faculty help to provide insight into shared experiences that can help inform decisions and interactions with students...Snacks are also nice 😊." ♦♦♦