BIO 3300 Undergraduate Research Scholars

Half of college students who intend to graduate with STEM degrees fail to do so within six years of starting college, and the majority of the students who leave STEM majors do so within the first year year (Suresh 2006; Watkins and Mazur 2013; Eagan et al. 2014). The reason can be attributed to two major factors: lack of support in the major leading to anxiety and burnout, and lack of confidence in personal success (Geisinger and Raman 2013; Seymour and Hewitt 1997; Suresh 2006; Watkins and Mazur 2013). There is a significant shift in instructional methods between high school and college STEM courses, which could be an additional factor driving student anxiety. One study demonstrated that the most common course-based concern from undergraduate students is not having enough personal access to their instructors, falling behind and not being able to find help, and not getting immediate feedback (Meaders et. al. 2020).

By building a course that not only provides a more personal experience with instructor interaction but also personalizing the material being taught, the opportunity to increase STEM retention grows. By empowering students to engage with the material in a way that is relevant to their lives and challenging them to stretch application to adjacent fields, they invest more deeply in what they are learning.

A neuroimmunology course at Stanford that incorporated science communication was able to achieve this by "maintain[ing] a primary focus on mastery of basic scientific content, [and giving] students the opportunity to develop skills to communicate science to a layperson audience...[the] objective was to provide an introduction that laid the foundation for students to become more aware of what it takes to communicate effectively with a non-scientist audience." The key, here, was that this course focused on undergraduates, rather than only providing communication training for seasoned researchers, which is, at best, spotty. One study evaluated several top-tier universities across the country and found a lack of formal, integrated training in communication, which denotes a critical gap in the curriculum (Brownell et al., 2013).

Ultimately, expanding the conversation about science communication training to include the needs of educators and diverse populations of undergraduates could help strengthen the scientific pipeline and create a new generation of scientists who can communicate more effectively with different audiences, right from the start (Gerecke, 2019). This will provide essential training for undergraduates at Baylor who wish to pursue a wide variety of career tracks, including, but not limited to: research, policy, consulting, business and entrepreneurship, medicine, and education. Students will exit this course feeling confident in their abilities to explain their research in a meaninful and impactful way across a variety of platforms and to a variety of audiences.

In summary, this course will:

- Promote proficiency in communication of complex scientific ideas to a variety of technical and non-technical audiences
- Introduce foundational skills for students to become more aware of what it takes to communicate effectively with a lay-audience
- Enhance undergraduate research experience by navigating the challenging and rigorous domain of academic research
- Guide students to produce a science communication portfolio that will act as a cornerstone for advancement in STEM

UNDERGRADUATE RESEARCH METHODS

COURSE DESCRIPTION

This course introduces various components of research communication and helps students develop concrete skills related to the practice of research. This course is geared toward providing students with important tools to write about and present research to an interdisciplinary audience spanning technical and non-technical audiences. Through discussions, readings, small group activities and work on research projects, students will be encouraged to think critically about and gain practice in elements of the research process.

OBJECTIVES

As a result of this course you will be able to:

- Describe the interplay and importance of science communication in STEM spaces
- Develop a message specific to a variety of audiences
- Create narrative explanations of scientific concepts
- Craft and deliver excellent, rigorous, and compelling scientific presentations

COURSE REQUIRMENTS

Attendance 50
Participation 50
Assignments 400
- Discussion board ..... [60 points]
- Elevator pitch ..... [20 points]
- Career documents ..... [20 points]
- Communication and cultures essay ..... [50 points]
- Literature review ..... [50 points]
- Poster ..... [50 points]
- Abstract ..... [25 points]
- PowerPoint Presentation ..... [50 points]
- Blog/social media post ..... [25 points]
- Outreach plan ..... [50 points]

Unit reflection essays ..... [4 @ 50 points] 200
Final project and portfolio 300

SCHEDULE AND TOPICS

The course is broken up into 5 units, each 3 weeks long. Unit 1 of the course focuses on building a strong foundation about research in the academy and career development, Unit 2 is designed to teach message development and science communication basics, Unit 3 concentrates on technical communication, Unit 4 focuses on non-technical communication, and Unit 5 is the capstone unit, assembling knowledge from prior weeks into a portfolio presentation.

Assignments are due by 11:59pm CST on the Sunday following the last class of the week, unless otherwise explicitly noted. Example: The week begins on Monday, January 1st. The assignment would be due Sunday, January 7th at 11:59pm CST.

Unit	Week	Topics			Assignments
		Monday	Wednesday	Friday	
Research in the Academy	1	Sharing research	Career Documents	CVs vs Resumes in Research	Elevator pitch due
	2	Careers in STEM and Science Communication		Guest speaker	Resume and CV draft due
	3	Peer CV/resume edits	Importance of SciComm in Research		IDP due
Science Communication Fundamentals	4	Identifying audience	Communicating science across cultures	Guest speaker	Unit 1 Reflection essay due
	5	Science storytelling and mechanics			Communication and cultures essay due
	6	Visual science communication	Oral science communication	Guest speaker	Weekly discussion board post
Communicating to a Technical Audience	7	Engaging with primary literature	Researching a Literature Review (Intro)	Guest speaker	Unit 2 Reflection essay due
	8	Writing an abstract	Fundamentals of poster design	Poster peer review and work day	Literature Review outline due Poster draft due Abstract draft due
	9	Delivery of presentations (conference setting)	Delivery of presentations (informal setting)	Guest speaker	Poster due Abstract due PowerPoint presentation due
Communicating to a Non-Technical Audience	10	Informal talks: simplyfing compex ideas		Talking to the media/social media	Unit 3 Reflection essay due
	11	Blogging and lay-language papers	Podcasts	Guest speaker	Blog or social media post due
	12	What makes a good science outreach activity		Guest speaker	Outreach activity plan due
Final Projects/ Presentations	13	Portfolio and final presentation review	In class work day	Guest speaker	Unit 4 Reflection essay due
	14	In class work day	In class work day	Presentations	Portfolio due
	15	Presentations	Presentations	Course reflection and evaluation	Have a good break!