

Theory and Practice of Emerging Technology Innovation (PI: David Hyde)

Context

Vanderbilt University is well-poised to serve the need of its entrepreneurial students, with top-tier business and law programs and a recently built innovation center, the Wond'ry. However, gaps exist with the available courses available at the university:

1. No course provides a broad overview of emerging technologies; while there are semester-long classes on, e.g., AI, no course provides a holistic view of the field of emerging tech and training on the unique challenges of innovating with deep/emerging tech.
2. Existing courses do not place a continuous emphasis on societal, environmental, and ethical impacts of these technologies (e.g., solving bitcoin mining's energy usage).
3. Few courses, especially in STEM, perform dedicated/targeted outreach to students in order to recruit diverse and inclusive student rosters.

This proposal will develop a new course at Vanderbilt. This includes the development of lecture materials, assignments, and project guides. However, the course will also include the recruitment of guest speakers from the local entrepreneurial ecosystem, as well as from major innovation hubs like Silicon Valley and Stanford University.

The goals and objectives of this proposal include:

1. Training an inclusive cohort of students how to think about, engage with, and innovate upon successive generations of emerging technologies
2. Providing students a survey of current emerging technologies and their societal, environmental, and ethical implications and considerations
3. Giving students the freedom to collaboratively explore a deep/emerging technology for a semester in a low-risk university setting where emerging technologies (and experts studying them) are readily available

Proposed Initiative

The proposed class will cover a different emerging technology each week; for example, planned themes include artificial intelligence, blockchain, smart cities, quantum computing, advanced life sciences, additive manufacturing, robotics/autonomy, and 5G. Each unit will cover the emerging technology in mature technical depth while being presented in a way that is accessible to students from across campus (including professional and graduate students in business, medicine, law, and policy). Moreover, each emerging technology will be contextualized in terms of society, the environment, and ethics; for instance, talking about bias in neural networks, or the pending environmental challenge of recycling/disposing of electric car batteries. Throughout the majority of the course, student teams will also be working on developing a final project on forming a real or model venture using emerging technologies.

Critically, students will be able to gain first-hand experience with all the technologies discussed in the course via partnerships with the Wond'ry and local entrepreneurs; for instance, exploring VR/AR environments using the latest hardware, or programming quantum computers using IBM's API to which Vanderbilt has access.

Targeted direct advertising via mailing lists for URGs and associated clubs will be used to help recruit an inclusive class. Moreover, Vanderbilt (which has pioneered “Inclusion Engineering”) has a number of equity, diversity, and inclusion programs and staff who will be directly engaged to help ensure a diverse student roster.

Teams and Partners

David Hyde will teach the class and lead all course development activities, including coordinating outreach to URGs.

Entrepreneurial Ecosystem

Vanderbilt’s entrepreneurial ecosystem is centered on the Wond’ry, a 13,000 square foot facility with VR labs, makerspaces, workshops, training opportunities, and entrepreneurial/innovation programs. Wond’ry entrepreneurial programs include idea formation, venture launching, early-stage startup development, as well as mentor programs with industry experts. The Wond’ry also helps participating teams access grants via the NSF Innovation Corps program.

Students and teams in the proposed course would be enthusiastically connected with this entrepreneurial ecosystem. For example, Wond’ry staff can be guest speakers to the course and discuss available opportunities. Final project presentations can also be hosted at the Wond’ry. Depending on the idea, student teams in the course may want to avail themselves of the practical labs available at the Wond’ry (mixed reality, additive manufacturing, etc.). In these ways, the proposed course will be woven into the fabric of Vanderbilt’s developing ecosystem for innovation, while representing a novel and crucial addition to the campus.

Work Plan

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| Spring 2022 | Develop course materials, including lectures, assignments, and project guidelines |
| Summer 2022 | Finalize guest speakers |
| Fall 2022 | First offering of the course |
| Spring 2023 | Interested teams from first course offering can continue pursuing their projects with Vanderbilt Wond’ry programming and/or with local community partners |

Outcomes

Besides the obvious direct outcome of a novel innovation course, the broader intended outcome of this initiative is building a sustained pipeline of student innovators who directly engage with emerging technologies, form teams and ventures around these technologies, and actively consider the societal, environmental, and ethical ramifications of emerging technologies. Vanderbilt is located in Nashville, which is one of the world’s fastest growing tech hubs; with this initiative, the university is poised to create a generation of diverse leaders who can harness the city’s burgeoning pools of labor and capital in order to establish a pervasive culture and ecosystem for pioneering emerging technology and associated successful ventures.