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EngineerFEST: Building Community and Engagement Among First-Year Engineering Students

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Abstract

This complete evidence-based paper describes the basis for and the implementation of "EngineerFEST," an effective student engagement event. EngineerFEST is an annual fall semester engineering student organization and essential student services fair at a mid-Atlantic, R1 institution embedded in Appalachia. More than simply a "Student Organization Fair," this event fosters student engagement and introduces first-year students to opportunities that broaden their participation and enhance their academic success in engineering. By providing a platform for student organizations to highlight their work and recruit new participants, EngineerFEST encourages peer learning and interdisciplinary interaction, enhancing the educational experience. Representatives from Career Services, Libraries, Study Abroad, and Student Services participate to inform students about available resources and networking opportunities. Additionally, students from varied backgrounds are made to feel welcomed and included, fostering a sense of belonging through the active participation of organizations such as the Society of Women Engineers (SWE), the National Society of Black Engineers (NSBE), and the Society of Hispanic Professional Engineers (SHPE). This paper explores the impact of EngineerFEST on student engagement, describes the logistics of planning the event, and presents feedback from participants to demonstrate its effectiveness in shaping a vibrant engineering community.

1.0 Introduction and History

Dr. Jack Byrd introduced the "Freshman Social," an engineering-focused student organization fair, to our college in the early 2000s to introduce new engineering students in the newly formed engineering first-year seminar course (ENGR 191) to the wealth of opportunities available to students through participation in career-relevant student organizations, many of which are student chapters of professional engineering organizations that are often recognized nationally and/or internationally. Designed to support students' transition to college life, ENGR 191 currently incorporates active learning strategies to facilitate student exploration of programs, policies, and services that promote academic success. Students engage in "Out of Class Experiences" (OCEs), like EngineerFEST and department visits, and participate in "Academic Enrichment" (AE) by studying and doing homework in the tutor-supported Engineering Learning Center for at least one hour each week to hone study skills. Initially this early-term "social" was held outdoors, provided cake and punch for all participants, and encouraged (but did not require) participation of engineering-related student organizations and first-year students. While well-planned, this optional event did not attract the number of student organizations or first-year participants the College sought. In 2004, to address these concerns, the event was refreshed by renaming it EngineerFEST, changing the menu to pizza and soda, and requiring all ENGR 191 students to attend as a course requirement. EngineerFEST quickly grew to an exceptionally large event, moved indoors (the first year it rained), changed venues and menus to accommodate growing crowds, and is currently held throughout the first floors of the two main engineering buildings, with organizations and relevant student support offices represented at tables throughout the hallways and lobbies. Over the years, EngineerFEST has evolved into a signature event, offering a modern, dynamic experience including an abundance of student organization tables featuring displays, brochures, posters, sign-up sheets, QR codes for more information

along with innovative engagement activities and the popular [State] pepperoni roll. Currently approximately eight hundred first-year students and forty of the sixty potential student organizations and student support service entities participate in this cornerstone event that fosters student engagement and retention.

2.0 Literature Review

The purpose of EngineerFEST is to foster early and sustained student engagement within the [College]. Research suggests that engaged students perform better academically and are more likely to persist to graduation. By connecting first-year students with peer mentors, professional development opportunities, and a sense of community, EngineerFEST lays the foundation for their success. Engineering festivals and events have become a dynamic approach to enhancing student engagement and learning in engineering education. Research highlights the role of diverse educational activities in fostering inclusion and feelings of belonging among students. For instance, Rambo-Hernandez et al. (2020) examined the impact of inclusion-awareness activities in first year engineering classes, revealing positive outcomes in student retention and belongingness [1].

Programmatic support tailored to facilitate student success has also been a cornerstone of effective engineering education. Hensel and Sigler (2007) discussed strategies for supporting students through structured programs, emphasizing the need for mentorship and academic resources [2]. Similarly, Myers, Byrd, and Hensel (2005) focused on designing first-year programs aimed at boosting retention and academic performance, including event-based learning contexts like EngineerFEST [3]. Exploring students' perceptions and self-efficacy in engineering is crucial for understanding the broader impacts of such initiatives. Morris, Dygert, and Hensel (2020) linked students' views of engineering as a career to their self-efficacy and grit, suggesting that well-designed events can reinforce positive perceptions and career aspirations [4].

Engineering festivals also offer a platform for addressing regional challenges. Santiago and Hensel (2012) highlighted retention issues specific to engineering students in Appalachia, underlining the importance of localized, culturally responsive programs [5]. Winn et al. (2011) supported this perspective by detailing an integrated approach to recruiting and retaining Appalachian students, demonstrating how events can bridge gaps in access and opportunity [6]. Part of the EngineerFEST experience includes sampling specialized foods, in this case the pepperoni roll.

Also, information fluency is essential in preparing students for the challenges of modern engineering fields. Armour-Gemmen, Hensel, and Strife (2020) outlined strategies for fostering information fluency in first-year engineering students, which can be integrated into engineering events to enhance learning outcomes [7].

Incorporating project management methodologies into educational initiatives can further enhance their effectiveness. O'Toole (2005) explored the parallels between event management and standard project management, providing insights into the logistical and pedagogical planning required for successful engineering festivals [8]. These frameworks ensure that events are not only engaging but also deliver measurable educational outcomes. In this case, graduate teaching assistants from the department are learning a variety of project management skills through the

important behind the scenes activities and duties as well as organizational skills related to time management in facilitating the smooth operation of the event in working with student organizations, first-year students and each other. Overall, engineering festivals like EngineerFEST can draw from these varied research insights to create engaging, welcoming, and educationally impactful events. By incorporating social elements and programmatic support with effective management, such initiatives can transform engineering education at both individual and community levels.

3.0 Event Overview

EngineerFEST is a student organization fair geared toward introducing first-year engineering and computing majors to the wide array of student organizations and student services available to them. Representatives from student organizations and campus resources host information tables throughout the first floor of the College engineering buildings, showcasing their activities and services. Figure 1 shows the layout for the event with participating student and service organizations setting up at their numbered designated table.

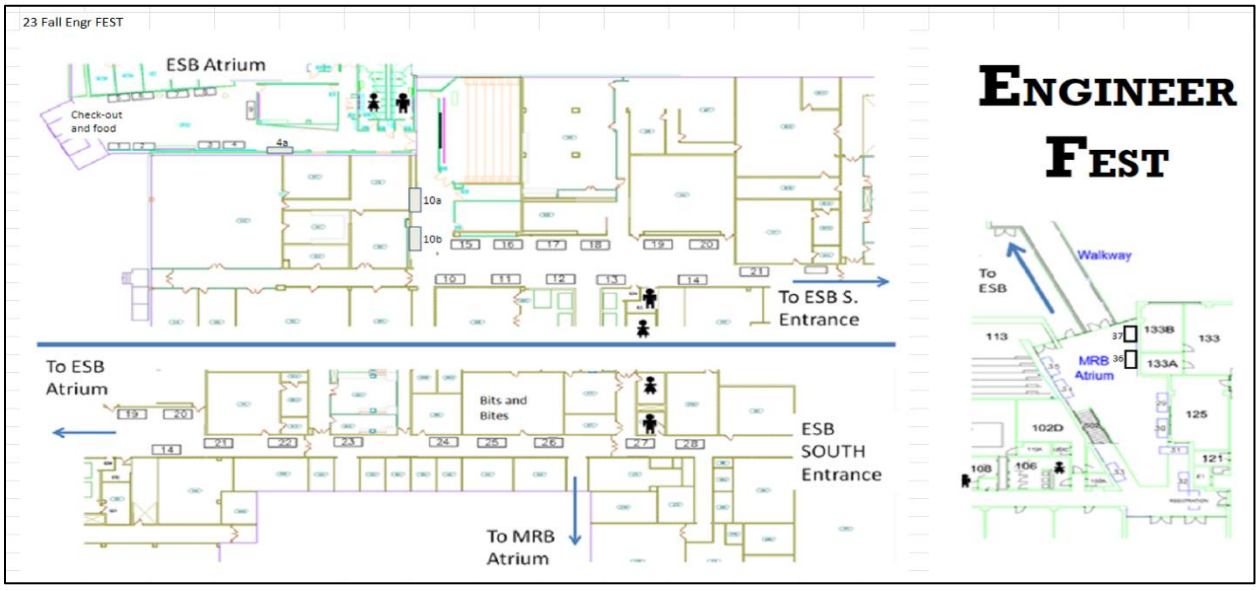

Figure 1. Map of first floor with numbered tables for student and service organizations in the two engineering buildings.

First-year engineering students begin their EngineerFEST experience by entering through a designated door to a check-in table where they are welcomed and receive a paper "Bingo card" (as shown in Figures 2 & 3) along with scanning the QR code of the map detailing the locations of participating student and service organization tables. As students visit organization tables, they receive a stamp per organization on their bingo cards, gaining exposure to the organizations and their activities. The Bingo card is a tool to increase conversation, participation, and engagement by reducing the anxiety of approaching new people, in this case, at the organization tables. After completing their Bingo cards by collecting the required nine stamps, students submit their Bingo cards, receive snacks—a pepperoni roll and water/soda, and finish by swiping their student ID card to record attendance.

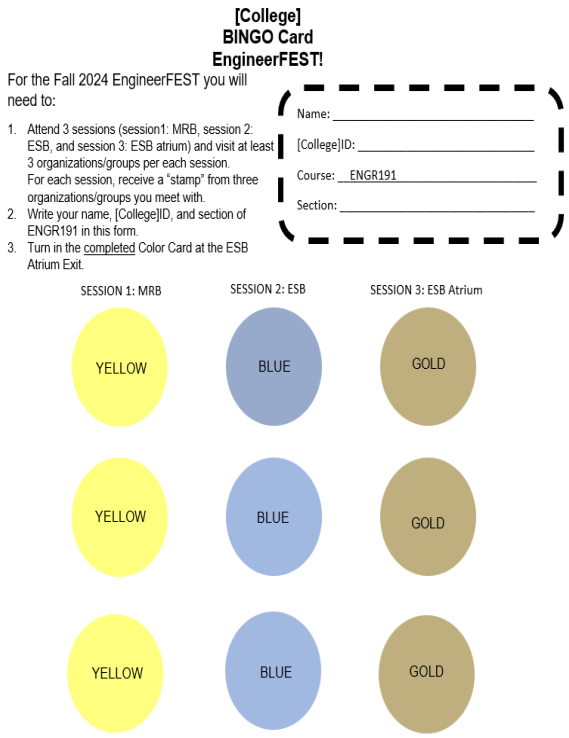

Figure 2. Bingo card front.

Table	Organization, Company, or Support Group
1	EcoCar EV Challenge
2	[College] Library
3	Society of Automotive Engineers (SAE)
4	The Whiting Turner Contracting Company
4a	[College] Marketing and Communication
6	Institute of Electrical & Electronics Engineers (IEEE)
7	Society of Petroleum Engineers (SPE)
8	Institute of Industrial and Systems Engineers (IISE)
9	Career Services
10	American Water Works Association (AWWA)
10a	[College] HUB
11	Women in Mining (WIM)
12	Biomedical Engineering Society (BMES)
13	[Name of] Center
14	STEM for the Arts
15	Formula SAE (SAE)
16	Alpha Omega Epsilon (AOE)
17	Society of Hispanic Professional Engineers (SHPE)
18	American Institute of Chemical Engineers (AIChE)
19	Sigma Phi Delta (SPD)
20	Society of Women Engineers (SWE)
21	Rocketry
22	American Society of Civil Engineers (ASCE)
23	Design/Build/Fly (DBF)
24	Eta Kappa Nu (HNK)
25	Artificial Intelligence [College]
26	Homebrew Computer Club
29	[College] Advising Center and [College] Student Services
30	Amateur Radio Club
31	Alpha Pi Mu (APM)
32	Space Club
33	Study Abroad Program
34	American Society of Mechanical Engineers (ASME)
35	Chi Epsilon Civil Engineering Honors Society
36	Materials Research Society
37	Society for Mining, Metallurgy & Exploration (SME)

Figure 3. Bingo card back.

Participating organizations include competition teams (e.g., EcoCar, Baja Car), affinity groups (e.g., SWE, NSBE, SHPE, and oSTEM), student chapters of professional engineering organizations (American Association of Drilling Engineers; American Institute of Aeronautics and Astronautics (AIAA), American Institute of Chemical Engineers (AIChE), American Society of Civil Engineers (ASCE), American Society of Mechanical Engineers (ASME), American Water Works Association (AWWA), Society for Mining, Metallurgy, and Exploration; Society of Petroleum Engineers (SME), and others) and technical interest groups (e.g., CYBER[College], Amateur Radio Club, etc.) as shown in Figure 4. These groups highlight opportunities for technical and professional skill development, leadership growth, and community building. Additionally, campus resources such as Career Services, Libraries, and Study Abroad, and the on-campus mental health facility ([Name] Center) provide information about their services and support networks for engineering students. Figure 4, below, lists the organizations that have participated in EngineerFEST.

1. Alpha Omega Epsilon (AOE) 2. Alpha Pi Mu 3. Amateur Radio Club (ARC) 4. American Association of Drilling Engineers (AADE)	30. NASA [State] Space Grant (NASA[ST]SG) 31. Rocketry 32. Sigma Phi Delta (SPD) 33. Society for Mining, Metallurgy, and Exploration (SME)

5. American Institute of Aeronautics and Astronautics (AIAA) 6. American Institute of Chemical Engineers (AIChE) 7. American Society of Civil Engineers (ASCE) 8. American Society of Mechanical Engineers (ASME) 9. American Water Works Association (AWWA) 10. Artificial Intelligence [College] (AI [College]) 11. Association of Energy Engineers (AEE) 12. Biomedical Engineering Society (BMES) 13. Career Services 14. [College]Center 15. Chi Epsilon Civil Engineering Honor Society 16. Collegiate Recovery 17. Cyber [College] 18. Design, Build, Fly Club (DBF) 19. EcoCar EV Challenge 20. Engineers without Borders 21. Eta Kappa Nu (HKN) 22. [College] Library 23. Experimental Rocketry Club 24. Formula SAE (FSAE) 25. Homebrew Computer Club 26. Institute of Electrical and Electronics Engineers (IEEE) 27. Institute of Industrial & Systems Engineers (IENG) 28. Materials Advantage/Materials Research Society (MAMR) 29. National Society of Black Engineers (NSBE)	34. Society of Automotive Engineers (SAE) 35. Society of Hispanic Professional Engineers (SHPE) 36. Society of Petroleum Engineers (SPE) 37. Society of Women Engineers (SWE) 38. SPACE Club 39. [College] Advising Center 40. [College] Marketing and Communication 41. [College] Student Services 42. STEM for the Arts 43. Structural Engineering Institute Graduate Student Chapter 44. Student Partnership for the Advancement of Cosmic Exploration 45. Student Society for the Advancement of Biometrics 46. Study Abroad Program (Education Abroad) 47. Tau Beta Pi (TBP) 48. Upsilon Pi Epsilon (UPE) 49. VEX Robotics Team 50. [State] Institute of Transportation Engineers 51. Whiting Turner Contracting 52. Women in Cybersecurity (WIC) 53. Women in Mining (WIM) 54. Experimental Rocketry 55. [College] HUB 56. [College] oSTEM 57. [College] Robotics Club 58. [College] Rover Competition

Figure 4. Organizations that have currently and/or previously participated in EngineerFEST.

4.0 Attendance and Impact

Since its inception in 2004, attendance numbers have ranged from 450 (early years) to 1200+ students (2012-2013) because it was a requirement for students in three typical first-year courses (including the first-year seminar course). To reduce the attendance to a more manageable level and to focus on true first-semester students, currently EngineerFEST is required only for students in ENGR 191. Since that change, annual attendance aligns closely with first-time, full-time first-year enrollment. In both fall 2023 and fall 2024, EngineerFEST hosted approximately eight hundred (800) first-year students. Typically, approximately forty [College] student organizations

also participate annually, representing a diverse array of interests and focus areas. Feedback from student organizations obtained during debriefings at the end of the event indicated high levels of enthusiasm and appreciation for the opportunity to recruit new members and showcase their initiatives. Student feedback underscores the value of EngineerFEST in building connections and providing a sense of belonging. At the conclusion of the event, first-year students reported to faculty that EngineerFEST helped them identify organizations that aligned with their interests and gave them confidence to explore leadership and collaboration opportunities. Participating students also reported that the informal mentorship from upper-level students during the table visits further enriched the overall experience.

5.0 Event Logistics and Planning

EngineerFEST requires careful coordination to accommodate the large number of first-year engineering students and organizations while ensuring a seamless experience. Key considerations include:

- **Logistics:** Assign personnel to necessary duties related to pre-planning of the event, preparation before the event, the running of the event, post event clean up and event evaluation. The pre-planning stage includes the assignment of tasks, roles, budgeting and creating the timeline for the event.
- **Scheduling:** Create a timeline for ordering supplies, creating media, event set up, actual event, clean up, post meeting wrap up. Finally, it is important to write and send thank you notes (or emails).
- **Venue setup:** Reserve the necessary space for the event and design the space arrangement and set-up. The set up includes the arrangement of tables and chairs throughout the college buildings per the map and placing tablecloths and printed table tents listing the organization name on each table. Colored tablecloths and balloons are used to identify categories of organizations related to the color coding on the Bingo card that students complete as part of the activity.
- **Marketing:** Promote the event through a myriad of opportunities, including contacting students in the first-year courses, providing email notifications, creating fliers and social media content, as well as contacting and scheduling with the various participating entities. It is also important to have someone assigned to take photographs of the event.
- **Materials:** Secure and create necessary materials. For this event materials include a welcome station, balloons, tablecloths, table tents, Bingo cards, stamps, and ink, QR code for the event map, event signage, card swipe and laptop, refreshments, and name tags.

6.0 Challenges

The challenges faced during the execution of this event were numerous and related mostly to the complicated logistics of the event. For example, reaching out to all student organizations proved to be difficult because our Office of Student Outreach did not have the necessary contact information. To address this, we created a sign-up page where organizations could register to participate.

Another challenge is the limited space to accommodate all the student organizations who want to participate. Historically, as the participation from both student organizations and first-year students increased, larger and larger venues were needed. Currently, EngineerFEST uses the first-floor hallways and atriums of two large engineering buildings. These spaces can

accommodate approximately fifty (50) tables. In fall 2024, those student organizations who registered at the last minute were necessarily assigned to shared space, with two student organizations sharing one table. To address the challenge of managing the large number of first-year engineering students attending EngineerFEST, a batch check-in system was implemented. Students were grouped according to their first-year seminar class sections, with check-in times scheduled in 20-minute intervals to regulate event traffic. Initially, two welcome stations were set up, but a third impromptu station, staffed by two graduate students, was added to accommodate waiting students and improve traffic flow. While preparing the schedule, two additional check-in time slots were added to accommodate students with scheduling conflicts, independent of any course section.

Ensuring adequate personnel for setup and post-event cleanup also posed a challenge. Faculty and graduate students supported the event by assisting with both tasks, while leaders from participating student organizations were encouraged to help with cleanup. The cleanup process was completed efficiently with support from the student organizations. Institutions hosting an EngineerFEST should develop a document detailing duties and expectations for all volunteers, including participating student organizations, further student organizations should be given information outlining their responsibilities in helping with post-event cleanup.

7.0 Limitations and Future Work

This work has several limitations that must be noted and addressed in future efforts. The scarcity of quantitative data and the related absence of statistical analysis limit the relevance and significance of this work. While overall participation data is provided (sign-ins), additional data about the first-year student participants or the student organization representatives were not collected. Future EngineerFEST events could include an "exit survey" in which participants (students, student organizations, faculty, and staff) are asked to respond to questions and provide feedback on their EngineerFEST experience to provide a holistic view of the event's impact and effectiveness. Additional information related to impact measurements, including membership growth in participating organizations and student services usage would also strengthen this work. Future work could include post-event surveys for student organizations, along with follow-up surveys, to assess any impact on membership growth and sustained participation levels potentially resulting from hosting a table at EngineerFEST. Student feedback on how the event affected their enthusiasm for engineering could be gathered through surveys and focus groups conducted by faculty and graduate students teaching first-year seminars. Finally, student participation could be analyzed in relation to first-year retention to provide better insight into the event's effectiveness in helping students persist and become academically successful.

8.0 Summary and Conclusion

EngineerFEST has evolved over two decades into a hallmark event that effectively engages first-year engineering students. By connecting them with diverse organizations and resources, the event fosters belonging, academic success, professional development, and community building. Feedback from students, organizations, and faculty consistently highlights its value in shaping future leaders. Moving forward, EngineerFEST will continue to adapt and innovate, ensuring its relevance and impact in the evolving field of engineering education.

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