# Freshman-year Initiative for a Cohort of Largely Engineering Minority Students

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# Work in progress: Freshman year initiative for a cohort of largely engineering minority students

**Abstract —** The type of paper submission that is proposed here represents the category, Work in Progress. A first-year program, titled STRIDE, was developed and piloted at University of Hartford, a private university in the New England region of the United States, with the goal of supporting African-American/Black and Hispanic/Latino male students in achieving academic excellence at the institution. During this time, the demographics of the institution included between 10% and 20% self-identified African-American students, and between 10% and 20% self-identified Hispanic students. Architecture, engineering, and technology students make up between 10% and 30% of the entering first year students. There was an application process for the program. Students who were accepted, would be a part of a cohort of students who met with a lead instructor weekly, with the program being run as a 1-credit course. Additional instructors from the student life side were also available to help facilitate activities, and connect students to co-curricular and extra-curricular aspects of college life. The present paper will describe some of the programming and assignments of this pilot program, and discuss some of the related strengths, weaknesses, challenges, and successes. A primary focus of the programming was to help students maximize their academic skills; contribute to and benefit from productive university communities; offer best practices to help them navigate their college careers; and work individually and collectively to further promote the goals of the program. The efforts described in this study may provide a model for a wide range of retention and success programs, based around diverse populations and affinity groups, or general cohorts of students. Aggregate results indicate that this cohort was able to achieve significantly higher GPAs and complete a higher number of credits as compared to similar populations of students. This paper further discerns the impact on the engineering students, who coincidentally made up over 40% of the group, showing that first year initiatives which include more than only engineers can be effective for engineering students.

## Introduction

First to second year retention efforts at 4-year colleges and universities are of interest, as institutions work to directly promote retention, prevent attrition, and encourage the factors that promote persistence in students, including underrepresented minorities (URMs). Chiang et al. analyzed longitudinal data on 3,670 students at 217 institutions, including 1,634 of whom were underrepresented minority (URM) students examining factors that contribute to the persistence of URM undergraduates [1]. The authors offered that while data suggests that characteristics like prior academic preparation makes a difference in URM students' odds of persisting in STEM majors, findings also suggested key moves that institutions could adopt to reduce racial disparities, and increase the overall number of science degree recipients [1]. These include providing URM students with more extracurricular opportunities to engage meaningfully in their chosen major, e.g., research programs, student networks that help navigate a STEM major, or even extracurricular major-related opportunities which address financial concerns to obviate the need to work long hours at jobs off campus [1]. Although persistence without obtaining a degree is not the goal of first-year students entering a university, nor for stakeholders such as parents, college administrators, nor state legislators [2], enhancement of first to second year retention

efforts, is a common step in the overall goal of having students persist through to graduation, arriving well-prepared for further success.

One of the factors that have been tied to retention is academic achievement [2, 3], with studies like that of Gershenfeld [4] indicating that underrepresented students' first-semester GPA might be a better predictor of whether they'll graduate college than their ACT score or their family's socioeconomic status (SES). It is understandable and intuitive that students with good grades would remain enrolled at a university, while those on the opposite end of the spectrum might potentially be dismissed, or leave, as academic dismissals have been reported to represent only 15–25% of all institutional departures [3, 5].

If academic achievement as early as first-semester, is connected to staying enrolled, and eventual earning of a degree, then consideration and awareness of factors which stimulate academic achievement – those which can be changed and those which cannot—is important. For example, as described by Strayhorn [3] and Tinto [5], academic achievement could indicate that a student possesses the competencies needed to succeed in college and that she or he may be more academically integrated in the college environment [3, 5]. Still, critiques of Tinto's widely used model of institution departure, suggest updates to the model, indicating that it is primarily applicable for "traditional" students, as opposed to diverse students, and that by suggesting that students break away from past associations to integrate into a university, it does not account for challenges that arise for some in integrating into a different culture entirely [6].

Some studies have indicated institutional barriers to the success of Black and Latino male students in engineering and related fields [7]. Long et al., in studying this topic, analyzed interviews with nearly 50 Black and Latino collegians to better understand barriers that might negatively impact their maximization of their success, identifying inadequate advising; poor quality teaching; limited course offerings; and insufficient financial aid as primary barriers. The paper further included recommendations for faculty, staff and administrators who are interested in increasing the number of Black and Latino male graduates in engineering and related STEM fields. Listed suggestions ranged from hiring more Black and Latino advisors who may have more shared cultural experiences to rewarding and incentivizing faculty (through the promotion and tenure process or otherwise) who tackle these issues; to enhanced mentorship by faculty and recent alumni; to creation of endowments and scholarships, and more. These suggestions are good ones, many of which must happen at the administration level, and were not included as part of the present pilot. Still, the goal of many of the suggestions seem to be to create a value system around (and recruit where necessary) faculty who are energized and incentivized to facilitate the needs of these populations of students in an equitable manner, much like institutions have historically provided environments that have been more seamlessly conducive to the success of what is many times described as "traditional" students. Such efforts are of interest as one day, pluralistic approaches may prevail in which all students, including those currently (or in the future) deemed as representing the "changing demographics of institutions" may too share the same perceived level of non-chilly environments as "traditional" students.

At universities across the country, like the one included in the present study, retention and success efforts are being considered, including the roles of various stakeholders across the campus in contributing to these efforts, and the format that these efforts will take. Birdwell et al. [8] recently described efforts encompassing Academic Advising and Student Affairs working together to improve first-year experiences of engineering students, by creating and implementing a seminar

course for first-year engineering students. They concluded that although challenges in communication and planning between the two offices remain, particularly in training Peer Advisers, their first-year engineering seminar course helping students in their first two quarters at the university, help students to form social bonds and learn valuable skills to aid their learning.

As of 2017, degrees awarded by the well over 300 schools with ABET-accredited bachelor's degrees programs in engineering in the U.S., reached 124,477 the highest level in 10 years; a 10 percent increase over 2016 and a 68 percent gain since 2008 [9]. In that same year, the numbers for Black or African-American males was 3,442, while for females it was 1,102, totaling 4544. The numbers of bachelor's Degrees awarded to women in general was 21.3% of the total [9]. Considering the lower numbers of Black females that are awarded degrees in engineering, it may sound contrite to highlight a program aimed at retention and success of Black and Latino students, without including women students. The interesting factor here is that context is key. The pilot program described in this paper stems out of identification of Black males as having lower retention rates across campus (not just engineering), and hence the effort is a noble one, but when writing about this program specifically through the lens of engineering students, the context is switched and it would appear that the program neglects Black and Latino females. This is an interesting phenomenon in the efforts of promoting diversity and inclusion, retention and success in consideration of context. One other factor which is specific to this institution, which counters this entire argument was the realization that there were already programs geared specifically at retention and success of women on campus and in engineering.

In any case, knowledge of the disparities in the pipeline of Black and Latino students, in engineering, sets the stage for retention and success efforts in specific consideration of engineering. Studies which can uncover factors and strategies that boost retention and ultimate degree attainment and success are of interest. This issue is for consideration by various organizations ranging from universities to professional societies and more. It is interesting to note the goal of the "50K Coalition" which includes preeminent diversity engineering organizations such as National Society of Black Engineers (NSBE), Society of Women Engineers (SWE), the Society of Hispanic Professional Engineers (SHPE), the American Indian Science and Engineering Society (AISES), and more than 40 organizations [10]. The shared goal is to have 50,000 diverse engineers graduating annually by 2025, with NSBE contributing to this goal through its own "10K goal," which is to lead the U.S. to produce 10,000 black bachelor's degree recipients in engineering annually by 2025, up from 3,501 graduates in 2014 [10].

While there may be an assortment of strategies that can work for all students, including diverse groups, there may also be specific strategies that are of benefit to particular groups. Hence, in some cases, it may be preferable to differentiate data on African American males from Latino males. For example, Strayhorn [3] showed that, contrary to monolithic perspectives, that assume all minority students are the same, upon disaggregating Adelman's (1999) general conclusion, it became evident that academic preparation was the most significant predictor of achievement in college for Latino males specifically, but not for African-American males. Instead, African American males' socioeconomic status (SES) was the most powerful predictor of achievement in college and conversely SES had no effect on grades for Latino male [3].

In regard to factors that could be addressed during a freshman semester cohort program, the primary strategy of this effort was to encourage academic excellence, and give students tools to help them help themselves to maximize their GPAs.

Although 17% of the entering first year students at the institution were "engineering students," i.e., students from University of Hartford's College of Engineering Technology and Architecture (CETA), these students made up 40% of the applicant pool, the largest group by far; going on to further make up 44% of the actual applicants and ultimately 46.7% of the students in the cohort, with seven of the 15 students being engineering students. This was completely by chance, and had nothing to do with the instructor, who was not yet revealed to the students, being an African-American male engineering faculty member.

As part of the program, activities such as mentoring, and leadership training were used to assist in the transition process, as students adjusted to college, identified and worked toward goals, and endeavored to achieve academic excellence. The program supports African-American and Hispanic male students during the fall semester of their first year, who have the potential for great success at the institution. Since this wasn't a pre-college overnight kind of experience, and instead was structured through a 1-credit course, the paper will detail the implementation of select activities on a weekly, monthly and overall basis. The nature of the program is described including the structure of the course, which could count for credit and a letter grade, as appropriate, and with vigorous focus not only on demonstration of learning outcomes related to study skills, professional development, and more, but also including separate incentivized challenges, and student life support,

**About the STRIDE Program at the University of Hartford**

The goal of the Success Team for Readiness, Improvement, Diversity, and Excellence (STRIDE) program is to support eligible Black/African-American and Latino/Hispanic male students in achieving academic excellence at University of Hartford. Activities such as mentoring, and leadership training are used to help students adjust to college and work towards their related goals. Established Fall 2018, this program aims to support Black and Latino male students during the fall semester of their first year who have the potential for great success at the University of Hartford. STRIDE offers activities to help students maximize their academic skills, contribute to and benefit from productive university communities, offer best practices to help navigate through their time at the university, and work individually and collectively to further promote the goals of the STRIDE program.

Students may apply for the STRIDE program for the following reasons: to ensure their college habits align with the level of success they would like to obtain in college; to learn about campus resources; to make new friends, who share similar aspirations; to help develop mentoring relationships with faculty, staff, upperclassmen, and alumni; to most positively springboard their college career and to prepare to make the most of their experiences to come. Students are accepted for STRIDE through an application process. After that, they are registered into a 1-credit course at the university entitled "STRIDE Dialogue." Currently, the Lead Instructor for the course is an assistant professor. Instructors for the pilot semester also included two administrators from the

student life side of the university. Specific activities and programming for 2018 included but were not limited to:

- **Guaranteed 4.0 ©** – A proven system, combining learning methods with effective stress and time-management techniques.
- **Peer Mentoring** – A support network connecting upperclassmen with STRIDE students.
- **Panel Discussions** – Connecting students with diverse pools of alumni/professionals.
- **Info-sessions and workshops --** Discussing scholarships, financial assistance and more

Guaranteed 4.0 © **–** A proven system, combining learning methods with effective stress and time-management techniques. Guaranteed 4.0 Learning System, LLC is a company based out of Dallas Texas, which has developed this system, and helped implement it in programs at institutions across the country, including but not limited to Purdue University, University of Mississippi, Northeastern University, US Coast Guard Academy, the State University of New York (SUNY) – University at Buffalo, and more. While it is reported that the average person remembers only 10 to 30% of what they read, studies have shown that the Guaranteed 4.0 system is able to increase reading retention to over 80%.

**Week 1 – Welcome & Discussion**

The STRIDE Program was discussed with students and students were able to ask questions about the program, the reasoning behind it, the goals, and expectations. The assignment that students had at the end of this session, and to be completed before the next week, was to look at each of the syllabi that they had received for the week, and schedule their professor's office hours into their cellphones. This assignment set the stage for future encouragement of students to be aware of their professor's office hours to help build rapport before during and after they received the results of their exams. That way, they were aware of the importance of keeping up to speed in the course and utilizing the professor as a resource throughout the process.

**Week 2 – Guaranteed 4.0 © Workshop**

The standard 50-min class meeting time was cancelled, in favor of a later and longer (3 – 4-hours) evening session, with a special workshop presented by the invited guests from the Guaranteed 4.0 Program. This Guaranteed 4.0 Program is a proven system, combining learning methods with effective stress and time-management techniques. This helped to set the standards and give tangible advice for students, to work toward achieving their goals for the semester, with the ultimate goal of obtaining a 4.0 GPA for the semester.

The Guaranteed 4.0 program was highly recommended, and has demonstrated various impacts in programs across the country. Some results of the impact have also been reported in literature. Anderson-Rowland and Rowland reported that upon introducing the Guaranteed 4.0 Plan designed by Donna O. Johnson, to two freshman scholar cohorts in engineering, average academic performance as indicated by GPA's were better than first-semester GPA's for two previous cohorts that were not exposed to the Guaranteed 4.0 Plan [11]. Further, they concluded

that a student's success as indicated by their semester GPA was correlated with their self-reported percentage estimate of their utilization of the 4.0 plan, and could additionally be correlated with their high school (HS GPA). Examples of these equations are show below:

$$\text{GPA} = 1.08 + 3.2 \cdot [\text{G4 Effort}] \quad \text{(Eq. 1), [11]}$$
$$\text{GPA} = -1.49 + 2.43 \cdot [\text{G4 Effort}] + 0.87 \cdot [HS\ GPA] \quad \text{(Eq. 2), [11]}$$

Equation (1) is based on linear regression with only 4.0 Effort and the first-semester GPA, while Equation (2) is based on multiple regression with both 4.0 Effort and high school GPA. These equations were based on n = 16 students (instead of n = 18 students, since two outliers in the data were eliminated, as one student with a 3.82 HS GPA reported that he only used 10% of the 4.0 Plan, but still managed to earn a 3.0 GPA at the end of the first semester; and another student with a 3.68 HS GPA who reported that he used 80% of the 4.0 Plan and still only managed a 1.92 GPA during the first semester in college [11].

The assignment for the next week was for STRIDE students to demonstrate use of the recommended learning methods, including updating their Bullet Point (BP) Notebooks, for weekly review by the instructor. There were also select Guaranteed 4.0 activities to be completed. For more detailed information on the Guaranteed 4.0 program, see the reference provided [12].

**Week 3**

While Peer Mentors had been introduced from the first week of the program, this was the week to formally assign Peer Mentors to students groups at a ratio ranging from 1:3 to 1:5. The Peer Mentors were minority student leaders from across campus. They were selected in part based on their interest in the program, their motivation, their experience as student leaders and resident assistants (RAs), and their availability and flexibility in scheduling. These assignments happened a bit organically as students were paired with Peer Mentors by the college that they were in or some shared interest that had been revealed over the course of the first two weeks. While the Peer Mentors were responsible for assisting the instructors and helping support all the students, the assignment of three sub-groups created a clear structure where students had points of contact in between sessions, and for subsequent break-out sessions or activities which required groups, it was easy to fall into these mentor groups. It should be noted that all Peer Mentors had received training in the Guaranteed 4.0 Program and were able to check students' bullet point notes and other assignments.

In this week, the instructor lectured on the concept of forming goals using the "S.M.A.R.T" technique. Students were tasked with writing down goals for the semester and/or year, and then reviewing a few ancillary resources online about the acronym of "S.M.A.R.T." They were then tasked with re-writing their goals using the technique. Some of these pre and post goals were written on the board and as a class, the instructors, peer mentors, and students got to discuss whether they thought the post-goals were better and why. This was effective at helping students to better define and enhance their own individual goals in practical ways, and in consideration of academic excellence, and the upcoming year(s) in general, as appropriate. The tentative assignment was to use the "S.M.A.R.T." technique to form goal(s) for the semester and

year. Further, students were to continue to update their BP notebooks and complete select G4.0 activities.

**Weeks 4 -5**

By week 4, upon conferring with the instructors and Peer Mentors, it was decided that while the focus on academics was strong, it would be helpful if the cohort got to bond a bit more and help build a supportive environment among the students. Hence, it was decided that each session would contain some sort of icebreaker early on in each session, and that this method could continue each week as appropriate. With this new approach, the general schedule which would be followed for most sessions is shown in Table 1. This general itinerary was followed for weeks 4 and 5 and other weeks. However in weeks were there were pertinent responsibilities or activities, the icebreakers were foregone in exchange for other activities. One example of this is in week 6 in which a panel discussion was facilitated.

Table 1: General schedule for most sessions each week

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| 1. | Welcome back | Lead Instructor | 0:00 pm |
| 2. | Icebreaker(s) | Peer Mentors | 0:05 pm |
| 3. | Assignments –<br>Check of those due today; assigning of those due next week. | Lead Instructor<br>& Peer Mentors | 0:20 pm |
| 4. | Tentative Activities | Instructor | 0:30 pm |
| 5. | End | Lead Instructor | 0:50 pm |

For week 4, the assignments due on this day were to submit the Guaranteed 4.0 BP Notebooks and activities. The assignments that were due in the following week were to submit the monthly journal, including challenges and success experienced within the past month, and also plans for the upcoming month. Students also had to update their Guaranteed 4.0 BP Notebooks and complete associated activities. The activity for the day included a general check in with the cohort to check on their progress in school, and making students aware of select upcoming campus events that they should attend, including a Career Fair and leadership event.

For week #5, the assignments due on this day were those mentioned in the previous week (and also appearing on the syllabus). The assignments that were due in the following week were to join a professional organization at the university; prepare questions for the upcoming panel in Week 6, and complete specified activities related to the Guaranteed 4.0 Program, including updating their Bullet-point Notebooks.

The activities for the day in the class mainly consisted of an instructor-led discussion, which emphasized the importance of the assignments, strategies for maximizing their performance, and a variety of first-year college student milestones that students might be experiencing or expect to be experience in the coming weeks. One such milestone is: midterms, and what to do before, and after completing midterms, in regard to preparing, reflecting, improving, staying motivated whether performance is bad or good, and more. While initiating such talking points, the Lead Instructor was able to listen to students' perspectives, encourage the cohort to identify common themes in each of their stories and develop incremental strategies and

smart goals for each week. This could include identifying needs, tutoring resources, and updating daily/weekly schedules to utilize resources each week. Interestingly, many of these discussions and conversations spilled into office hour discussions, special one-on-one meetings outside of class, and follow ups with students as necessary. There were some students or even students' advisors or professors, who described to the STRIDE instructors, severe financial challenges of elect students, which distracted these students from focusing on their classes and learning. STRIDE instructors worked to help students address these issues through subsequent meetings with the financial aid office, and identifying opportunities on campus for work, work study, or scholarships. While the instructors had planned concerted efforts to have a financial and scholarship related talk during one of the final weeks of the course, it became apparent that these type of issues needed to be addressed as early as possible in the program. Hence, it is suggested that a presentation by financial aid and other related stakeholders take place early on in such a program.

While financial issues are one example of issues that were revealed and hence distracting students from there coursework, regardless of their academic strategies, there were various other challenges encountered by students. These could be related to personal and family issues, challenges encountered on campus, and various other issues that had to be addressed to help students maintain a clear mind which allowed them to address their studies. Academic challenges and strategies ranged from, how to know your grade in the class? to where are best places to study on campus? to how to handle group projects in class in which there is a student not carrying his or her weight? and much more. It should be noted that having a professor as lead instructor for this STRIDE Program, may have helped add a valuable layer of insight. For example, having a college professor encourage a student to attend other professor's office hours might be received better. Still, while consistent delivery of important messages was key, as an instructor, a big part of leading this effort was also listening to the students and responding to their needs in as real time as possible, especially as this was an initial pilot run of the program. Hence, while the development and execution of the programing was important, the instructor approach may have also played an important role in the process.

**Week 6 – Panel Black and Latino professionals**

In week 6, a panel discussion was facilitated titled: "Your history, your purpose, your moment. What does this college experience mean to you?" The guest panelists consisted of Black and Latino professionals from various fields, some of who were alumni of the university. They discussed their experiences, challenges, successes, and were open to discuss the perceived role that their race/ethnicity/gender/background plays in various experiences. Students had an opportunity to ask them questions about their careers, their road into these careers including their college experiences, and their advice for various anecdotal situations. This session was scheduled to have the weekly session run an extra 25 min.

**Weeks 7 – 11**

These weeks turned into more of a chance to check in with the group about classes, midterms, finances, and more. The general instructor-led discussion was about first-Year College Student Milestones for the third month, and highlighting of additional resources on campus

including various math tutoring outlets, a writing center, and where to go to request support and or tutoring for most classes. This included sharing direct contact information and photos or walking tours of these locations as appropriate after class. In Week 11 classes were cancelled due to a snowstorm. Week 12 was Thanksgiving Recess.

**Week 13 – A 3-Day Study Blitz + Outing**

The goal of this week was to have students finish the semester as strong as possible, by doubling down on their studies and efforts to maximize their final grades. A three-day event encompassed the typical meeting day (Thursday), and the Friday and Saturday after. On each day, from 9:00 am – 5:20 pm, a typically unavailable and quiet dining area with separate seating areas was reserved. Students were given vouchers to eat at the adjoining cafeteria with the option to eat at the cafeteria and then return to their studies or bring their food with them. Most students simply ate at the cafeteria and then returned to their studies. If students had class, or needed to attend their professor's office hours or meet with student groups, or utilize laboratory or studio facilities in their respective colleges, they were able to step out for these engagements and then return. The general idea was to have a central study location that students would study in for three days straight during the day. They also had vouchers which could be used for lunch. After 5:20 pm they could continue their regular evening schedules, which might include studying or completing final assignments. This was a mandatory event.

On Day 1 (Thursday) the study session ended at 4:30 pm and the general STRIDE session started with a guest speaker. On Day 2 the study session ended at 5:20 pm. On Day 3, the study session ended at 5:20 pm, and students were to board a bus for a culminating Saturday evening outing, which included fun activities like laser tag.

Students enjoyed the meals. The study area was very quiet and conducive to studying. Students appeared to be productive. One of the instructors was there each day. Peer Mentors also attended, taking advantage of the study environment. Unless students had a class conflict or equivalent (which was previously discussed), they were supposed to be at the event all day (each day) in between those commitments. The first day started with about four students, and others joined as schedules permit.

**Conclusion**

The program described as part of this study was a first-semester cohort program developed as part of an effort to help stimulate retention and success of students entering the university. Of the potential factors that could be addressed within the first-semester time frame, the primary strategy was to consistently encourage, support and highlight the approaches toward achievement of academic excellence, and give students tools to help them help themselves to maximize their GPAs. It was noticed that along the process, there were a good number of students who faced financial challenges which grew to distract them from focusing on their courses and learning. Although this was not the case for all of the students, it was for more than a few. While STRIDE instructors worked to help students address these issues through subsequent meetings with the financial aid office, and identifying opportunities on campus for work, work study, or scholarships, it is recommended that a presentation by representatives of scholarship and financial aid offices

and other related stakeholders on how students pay for school, take place as early in the program as possible. Such a talk was indeed scheduled as part of the STRIDE program, but it was scheduled for later in the semester, which was helpful, but which could have potentially been more effective if facilitated earlier. Overall, this iteration of the program was successful in supporting students and helping them to maximize their performance. Incentivizing performance is also useful in this process, as students are reminded that there are scholarships that are available to students with the highest GPAs, and that there are still ways to obtain these scholarships even as a freshman already in college (as opposed to entering college with scholarships). In the near future, it is anticipated that there will also be scholarships specifically designated for students from these types of programs who obtain a certain level of performance and/or improvement. Future studies on these effort should also report on student feedback of the semester-long experience, through surveys and/or interviews as appropriate.


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