# First-Year Engineering Program: Student Instructional Leadership Team

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***Abstract*** **- The Student Instructional Leadership Team (SILT) was organized during the autumn quarter of 2009 at The Ohio State University. The team consists of five student leadership positions that work across the First-Year Engineering Program which is part of the Engineering Education Innovation Center. The specific student leadership positions have been part of the program for years, but this is the first time that these roles have worked together on a holistic scale. The expectation is that this team will become a stable and ongoing component in the First-Year Engineering Program. When the team was established specific goals were identified to create a scope of work. Since SILT has only been in existence for one quarter, much of the work completed by the team has set the groundwork for the rest of the year and for years to come. In the future, SILT will continue to develop these initiatives. SILT supports student employees through a group of peers. It strives to help further the development of teaching assistants in many aspects of teaching and professional and personal development. The group continues to change and evolve, but with each iteration the team improves which helps to foster general improvements across the program.**

*Index Terms* - First-Year Engineering Program, SILT, teaching assistant

## INTRODUCTION

The First-Year Engineering Program (FEP) at The Ohio State University (OSU) provides instruction for all engineering students in the college. This program aims to teach the fundamentals of engineering, including visualization, teamwork, communication, and project management, as well as aiding students in the adjustment to college life. FEP makes extensive use of students, both graduate and undergraduate, as part of its instructional staff.

The program consists of two main sections: Fundamentals of Engineering (FE), for students without honors designation and students who are designated university scholars, and Fundamentals of Engineering for Honors (FEH), for students with honors designation. FE is a two-course sequence and FEH is a three-course sequence, with each containing a cornerstone design project. The structure of each teaching team with the number of students enrolled in each component listed in brackets is presented in Figure 1.

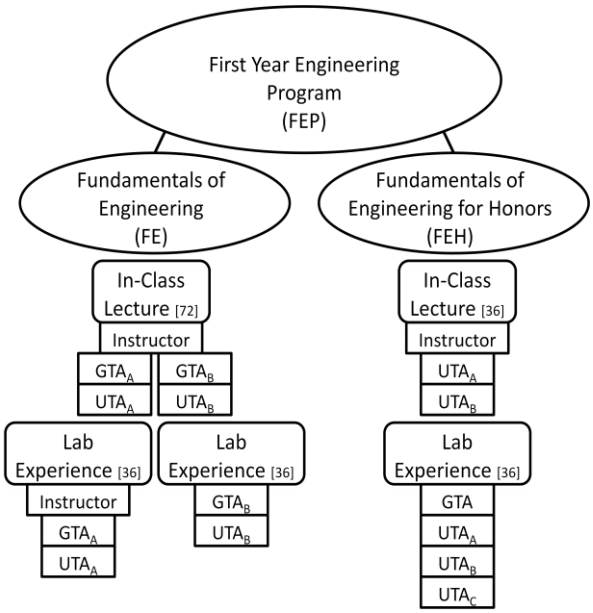


FIGURE 1: DIAGRAM OF FEP COURSE STRUCTURE

Over the past several years, FEP has been growing, with the number of students increasing by 30% to over 1400 students in 2009, approximately 70% of whom are in FE and 30% of whom are in FEH. With this increase in students, it was becoming increasingly difficult to maintain coherence between classes within each sequence as well as coherence program-wide. Additionally, the increase in students caused an increase in instructional staff, making it necessary to develop a strategy to ensure that all staff members continue to receive the best training and support possible.

These factors motivated the creation of a Student Instructional Leadership Team (SILT). This team brings together existing student leadership positions that have been an integral part of FEP for years. However, this is the first

time that these roles are working together to enhance the program on a holistic scale. The student leaders consist of both a lead graduate teaching associate (GTA) and a lead undergraduate teaching assistant (UTA) for FE and FEH, as well as a graduate teaching fellow (GTF) that serves both groups. These established roles with specific responsibilities smooth the transition for student instructional staff stepping into leadership positions. They provide consistency year to year, complimented by the one-year terms typically served by the student leads, allowing for fresh ideas and new perspectives each year. Additionally, the students in leadership roles have traditionally been early in their academic careers, mostly undergraduates and master's students, complimenting the experience of faculty instructors.

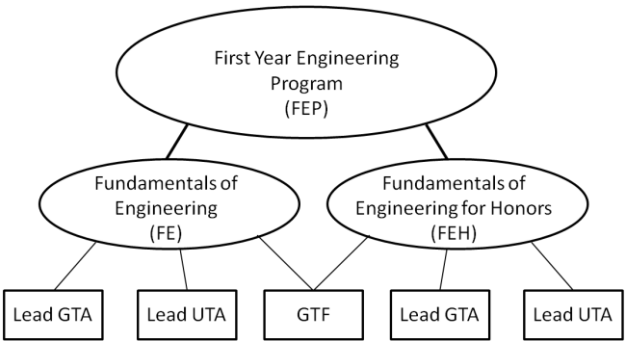


FIGURE 2: DIAGRAM OF PROGRAM WITH RELATION TO SILT MEMBERS

This paper details the goals and functions of SILT. The next section contains the basic responsibilities of each team member. Then, the goals of the team are detailed, followed by a description of how those goals are currently being met. The final section addresses the future of SILT.

## BASIC OUTLINE OF INDIVIDUAL RESPONSIBILITIES

As shown in Figure 2, SILT is comprised of five student leadership positions. Each position is unique with its own set of responsibilities. All the members of SILT work together for success but each member contributes to the program in a different way.

### *GTF*

The GTF is appointed by the department through a nomination and application process sponsored by The University Center for the Advancement of Teaching (UCAT). There are multiple GTFs at OSU from a variety of departments. All GTFs are required to attend a summer seminar, taught by UCAT, that focuses on teaching and GTA professional development. The GTFs are also required to attend meetings throughout the academic year which allow them to meet and discuss ideas. The main responsibility of any GTF is GTA professional development, but each department specifically defines what that means for their GTF. For FEP the GTF is responsible for serving as a link between FE and FEH, managing FE lab quizzes, helping GTAs prepare for labs, working with SILT on technical writing improvements, being a teaching resource or mentor to all GTAs and UTAs, managing the GTA Professional Development web page, and attending meetings for the FEP Advisory Committee, FEP curriculum committee, and both FE and FEH grading sessions. The GTF is also in charge of coordinating SILT meetings.

### *Lead GTA FE*

The lead GTA for FE is appointed by FEP supervisors and FE department coordinators and must have been a GTA for at least two quarters prior to their appointment. The FE lead GTA is responsible for facilitating training for all new FE GTAs, organizing exam review sessions for all FE class sections and coordinating micro-teaching sessions each quarter. This lead also fields any questions or issues pertaining to FE GTA curriculum content or class supervision to the appropriate party and coordinates FE GTA involvement in any open house or program visits. Similar to the GTF, this student employee is responsible for serving on various advisory and curriculum committees. The lead FE GTA coordinates approximately 30 FE GTAs.

### *Lead GTA FEH*

The lead GTA for FEH is also appointed by FEP supervisors and FEH department coordinators and must have had prior teaching experience within FEH either as a GTA or UTA. The lead FEH GTA is primarily responsible for lab-related development and training within FEH. Specifically, this team member coordinates the labs and lab training for FEH and implements lab curriculum improvements. This role also involves maintaining the online resources page for FEH class and lab materials and assisting with the coordination of open houses and other outreach events. The lead FEH GTA serves as a general resource to all of the GTAs and UTAs in FEH and sits on the curriculum and advisory committees for FEP. The lead FEH GTA coordinates approximately 8 FEH GTAs and 25 lab specific FEH UTAs.

### *Lead UTA FE*

The lead UTA for FE is a fourth year or fifth year senior UTA who is in charge of updating homework rubrics

throughout the year and forwarding these changes to the curriculum committee and their fellow 30 FE UTAs. The lead FE UTA also coordinates the UTA tutor room hours and UTA staffing for review sessions that are held before both the final and the midterm of the course. Occasionally the lead FE UTA will hold a grading session emphasizing standardized grading across the classroom sections. Training sessions for the entire teaching staff are held weekly, and it is the duty of the lead UTA to record and track quarterly attendance at these meetings.

*Lead UTA FEH*

The lead UTA for FEH is typically a fourth year or fifth year senior who has been with the program since their sophomore year (the first year a student is eligible to become a UTA). The lead UTA has many responsibilities, both inside and outside of the classroom. Within the classroom, the lead UTA is in charge of making sure all 30 FEH UTAs receive a copy of the answer key and rubrics for the current quarter. The lead UTA also informs all UTAs when there is mistake or correction in the key. For new UTAs, the lead UTA serves as a point of contact for any questions regarding the program, in-class assignments, or other general questions.

## GOALS

When SILT was first established we worked with the FEP director to develop a set of goals. The goals were designed to foster continued improvements in FEP through support from its student instructional staff and provided SILT with a defined scope of work. SILT established six key goals for success, which we hope will be refined by future SILT members.

- Support and mentor new student employees. Supporting and mentoring new student employees is an essential goal because of the high turnover rate in the program. We constantly have new TAs entering and exiting the program due to the transient nature of university education. While the teaching assistants are here, we want them to know there is a place where they can turn to for help, advice or materials.
- Meet learning objectives through continued support for curriculum enhancements. Many of the members of SILT are also in charge of curriculum improvements. The members who have curriculum duties work directly with other student employees and faculty. By incorporating this responsibility into SILT goals we create a framework providing consistency and priority to learning objectives.
- Improve technical writing through improved feedback mechanisms. Improving technical writing is an overarching goal of the College of Engineering. To help departments better facilitate these improvements, SILT decided to contribute by providing better and more consistent feedback on writing to freshman engineering students.
- Provide professional development opportunities for student employees. FEP has tried to provide student employees with professional development opportunities in the past, but no one group has been accountable for this task. SILT is the logical group to take command of this responsibility.
- Improve program learning objectives and focuses. Many SILT members also serve on the FEP Advisory Committee to help establish learning objectives and focuses. By including improvements to learning objectives as a goal, SILT hopes to represent the student employees on this committee in a more formal manner.
- Create consistency FEP serves hundreds of students every year and employs over 100 student employees. SILT wants each student to receive an experience consistent with other students in the program, and we want to provide our student employees with the tools to make this happen. Consistency within sections, between sections across FEP and year-to-year is the end goal.

## CURRENT GOAL INITIATIVES

The six goals that SILT has established can be met by a variety of activities. The following section outlines the activities being taken by SILT to meet the goals.

*Support and Mentor*

SILT begins to support and mentor new student employees before classes even begin at OSU. All new FEP GTAs are required to attend "Teaching Orientation@Ohio State: a University–Wide Orientation on Teaching for New GTAs and Faculty" facilitated by UCAT which usually takes place in mid September the week before classes begin [1]. By having new GTAs attend this orientation, FEP provides them with a base of knowledge on which to build their teaching experience. This also provides a venue for new GTAs to become familiar with other departments across the university and allows them to learn about UCAT as a teaching resource. Following the UCAT orientation SILT follows up with the participants on their experience during the FEP orientation and welcome lunch.

The FEP Orientation occurs the Monday before classes begin in fall quarter. It is the only time of the year where all instructors, UTAs, and GTAs from both FE and FEH come together in one room. During the day-long orientation a

variety of presentations and activities are planned, with assistance from SILT, to both educate the FEP instructional team on how to best help our students and also to foster community within the group. The morning session of orientation typically focuses on ways in which to help our incoming students, including an overview of the different resources available to them on campus, and presentations on effective teaching strategies. In the afternoon session, FE and FEH instructional teams break out into the respective groups in order to discuss what is new within the programs and what to expect in the upcoming school year.

During the FEP orientation there is a luncheon specifically for the new GTAs. In the past, this luncheon was a way to get the new GTAs to know each other if they had not met at the UCAT orientation. With the start of SILT, the luncheon has also become a platform for new GTAs to discuss their questions and concerns with fellow new GTAs and the lead FEH GTA, lead FE GTA and GTF. It is an open discussion that aims to alleviate nervousness about teaching for the first time.

FEP has many online resources available to its GTAs and UTAs. Most of these resources are available through OSU's course management website. These sites hold all the grading materials including rubrics and grading guidelines, and they also are a place for student employees to comment on assignments and resources for future improvements. SILT is responsible for managing the content of these sites.

*Curriculum Enhancements*

FEP achieves curriculum enhancements through a variety of projects, task forces and committees. The following section outlines SILT's involvement with a GTA routing system, lab and robot course development and an undergraduate established and run tutor table.

The teaching development routing system gives GTAs the opportunity to experience all facets of curriculum enhancements. The routing system has three components: curriculum development, curriculum maintenance, and GTA and UTA resource development and maintenance. The first component, curriculum development, provides GTAs the opportunity to work with faculty and staff to create new learning modules. This system can entail the creation of new lecture sessions, instructional materials or labs. This process provides GTAs with the experience of designing new learning modules that can inspire insight and new feedback to their personal teaching styles and philosophies. The second component, curriculum maintenance, allows GTAs to work on existing course content. Every quarter, GTAs, faculty, and staff work together to improve current course materials by modifying and improving learning modules. The third component, GTA and UTA resource development and maintenance, is the newest branch of the routing system. As the enrollment of engineering students increases annually, the need for more teaching assistants also increases. In the routing system, experienced GTAs establish standardized training procedures, teaching assistant learning modules, and consistent communication practices to address the growth of the program.

One of the ways the routing system is implemented specifically in FEH is the direct improvement of laboratory materials by the GTAs. Before each week of labs, a pair of GTAs with experience in the topics being covered implements the improvements to the lab suggested the previous year and identifies and implements any other needed improvements to the pre-laboratory reading assignments, lectures, or procedures. GTAs teaching in FEH are only responsible for teaching in the lab setting so their direct involvement in lab specific enhancements is crucial for FEH success.

Additionally, members of SILT, specifically the lead GTA and UTA for FEH, helps prepare for the quarter-long cornerstone design project performed by students in FEH. The students build an autonomous robot designed to complete a series of tasks in a two-minute time period. SILT facilitates the creation of a scenario for the competition (e.g., a robot in a "mining" scenario might be required to collect "ore" from the course) and coordinates student employee participation in fabricating the physical course.

Finally, a tutor table was established in order to assist the freshman students adapting to the demand of college level engineering courses. The tutor table located in the FEP computer lab is staffed by UTAs during the week for approximately ten hours each day. It is the job of the lead UTA for FE to schedule the tutor table hours quarterly, assess student needs, and make the necessary adjustments to staffing.

*Technical Writing*

The members of SILT are responsible for the coordination of various grading sessions. The grading session in FE and FEH look very different but serve similar functions. The sessions provide a way to improve student technical writing through consistent and meaningful feedback and also provide general consistency across FE and FEH sections.

In FE grading sessions are held almost weekly and are separated by course. They are not required, but attendance is strongly recommended. At these meetings, general concerns about grading are discussed and experienced GTAs often

share efficient grading practices. They make recommendations on feedback techniques and help draw attention to areas that seem to cause problems for students. Currently these meetings are also being used to establish more concrete and precise grading guidelines. FE has had rubrics to guide grading for some time, but these rubrics were not specific enough to create consistency among all course sections. The grading sessions provide a venue for this consistency to be created.

In FEH, the grading sessions are held once a quarter. These are mandatory grading sessions for all GTAs and new UTAs. At these meetings, practice pieces of student writing are distributed and graded by the meeting participants. The grading is then reviewed as a group so that everyone is aware of what is expected and how the writing should be graded. FEH has precise grading guidelines and a detailed document titled "FEH Guide to Lab Reports and Memos" that serves as the base for all grading and student writing. These resources make weekly meetings unnecessary

*Professional Development*

SILT is responsible for the coordination of professional development for student employees. Many of the professional development opportunities are optional but are always well-attended. The teaching assistants who consistently participate in these events tend to be future student instructional leaders. Professional development spans a wide range of topics including curriculum enhancements (discussed previously), workshops, microteaching opportunities, and feedback.

Professional development through workshops is a main area of interest for SILT. SILT is in charge of coordinating workshops through the use of members or through other university organizations and departments. At this time, SILT has had one workshop facilitated by the Office of Student Life. This particular workshop was designed for SILT and focused on group development and leadership. In the future, SILT hopes to hold optional workshops for all student employees on a range of topics from time management to student feedback. These workshops will be developed with the aid of the Office of Student Life and UCAT.

SILT helps provide all FEP GTAs with a microteaching experience. For FE, microteaching consists of three teaching sessions. It is a feedback-rich exercise in which GTAs practice teaching to a variety of audiences before being given lecturing responsibilities. The GTAs give lectures of increasing length over 3 quarters, where the first lecture is in front of peers while the latter two lectures are given in front of current students. They receive feedback in the form of oral and written responses, along with a recorded video session for self-study. FEH GTAs, meanwhile, enroll in an 800-level engineering education course that contains a microteaching experience. FEH GTAs also run the weekly laboratory component training that is required of all FEH student employees. The GTAs take turns leading these sessions with the assistance of the FEH lead GTA.

At the end of fall quarter, SILT wanted to establish a way for teaching teams to provide feedback to one another. After consulting with UCAT, we decided that each teaching pair in FE, a GTA and FE UTA, would write a letter to each other addressing the strengths and weakness they noticed throughout the past quarter to help teaching assistants further enhance their teaching. Before this time there was no formal way of providing feedback between the pairs. The instructors of each FE course were also asked to write a feedback letter to their GTAs. This method of feedback was not utilized in FEH because of the structure of the teaching teams.

*Program Learning Objectives*

The graduate students in SILT sit on two program-wide committees addressing curriculum enhancements. First, they represent student employees on the FEP advisory committee which addresses issues such as broad curriculum enhancements, space utilization and planning, and tracking enrollment. Recently, a focus of this committee has been to modify the FEP curriculum for the university-wide transition from the quarter system to semesters. Second, the GTAs and GTF in SILT sit on the FEP curriculum committee, which addresses specific curriculum improvements and enhancements.

In addition to FEP specific meetings, the GTF is responsible for attending GTF meetings throughout the quarter. These gatherings allow all the GTFs across the university to get together to share their triumphs and downfalls. It is a great way to network and to learn about other teaching programs at OSU. After these meetings the GTF reports any pertinent information to SILT. This method of information dissemination allows all SILT members to learn about other departments at the university, and it allows for cross campus communication.

*Consistency*

One program learning objective for SILT focuses on consistency of grading and GTA practices between course sections and across FEP. This is currently being addressed through four different actions: weekly lab training, grading

training, a computer aided design software portfolio, and microteaching.

Weekly training, in both FE and FEH, is a mandatory meeting to ensure consistency in communication and execution of classroom content. Consistency is also achieved through grading sessions which were previously outlined. The computer aided design software portfolio contains selected student assignments for the courses the GTAs and UTA will be teaching. The GTAs and UTAs are expected to complete this portfolio at the beginning of their teaching duties and are required to update their portfolios as changes are made to the program and the problems. This ensures that all teaching assistants have the ability and knowledge to use the software program proficiently. Finally, microteaching, discussed earlier, improves consistency in teaching.

## FUTURE PLANS TO MEET GOALS

SILT is still in its early stages of development, but we are already planning for the future. SILT has divided its future plans into two scopes: short term and long term.

*Short Term*

By the end of winter quarter, a needs assessment will be completed. The assessment will be distributed to all FEP student employees and will assess a variety of topics from professional development opportunities to individual experience. The hope is that this needs assessment will provide SILT with a status of the program from the perspective of the teaching assistants. Once this information has been collected and analyzed, SILT will adapt its approaches to better serve FEP student employees.

Due to the extensive nature of the FEP program, we have decided to submit a portfolio for the University Departmental Awards for Exemplary GTA Programs which is sponsored by the Graduate School and UCAT [2]. This portfolio will not only help the department gain recognition for its work with its student employees, but it will also be a way to pass SILT information on to future SILT members. As mentioned in the goals, consistency is a main concern for SILT, and this portfolio will provide a method by which to achieve consistency.

Additionally, SILT plans to improve the online resources available for both students and student employees, specifically the GTA professional development page. The GTA development page provides general teaching and learning resources to teaching assistants. It outlines many of the professional development opportunities available and also has general information on FEP.

A tracking system for student employee involvement is currently being developed by SILT and the FEP HR department. In the past, there have been many student employees who have gone above and beyond their contracted responsibility. FEP would like a way to formally track this extra involvement so that these teaching assistants could be formally recognized for their work. The tracking system is still in the development stage but will be fully operational late in winter quarter 2010.

To further aid SILT in their efforts a content analysis of the teaching team feedback will be conducted. This analysis along with the needs assessment will help provide SILT with a status update on the program. From the content analysis we hope to learn our teaching weaknesses, strengths and areas in need of improvements.

*Long Term*

In the future SILT will establish methods for improving information transfer from year-to-year. This transfer occurs within SILT, within its member roles, and program-wide. SILT will also create opportunities for FEP student employees to develop a stronger community, which will potentially foster increased involvement in FEP activities.

We would also like to institute a mentoring program pairing new student employees with experienced ones. These mentor pairs would meet on a regular basis. The new employees could ask questions of the veterans and learn from the veterans' experience. Furthermore, this would prevent any feelings of isolation for the new employees and would encourage networking. In the future the mentoring program could also be expanded to include faculty and staff to teaching assistant mentoring pairs.

## CONCLUSION

In conclusion, to address increases in enrollment and staffing, FEP established SILT to bring together existing student employee leadership positions and provide a holistic view of the program. We created goals to establish SILT's scope of work. From these goals, we identified what we were already doing that meet these objectives and how to better meet these goals through improving current initiatives and establishing new ones. This innovative approach allows student employees to have a direct impact on student education, teaching assistant professional development, curriculum enhancements, and program learning objectives.

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