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## **AC 2012-4349: IMPLEMENTING AN INDUSTRIAL MENTORING PROGRAM TO ENHANCE STUDENT MOTIVATION AND RETENTION**

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# Implementing an Industrial Mentoring Program to Enhance Student Motivation and Retention

## Abstract

A new industrial mentor program at our university connects practicing engineers with “Freshman Interest Groups (FIGs)” of 6-8 students. Far too many talented young minds walk away from engineering thinking, “I don’t want to work calculus problems in isolation the rest of my life, so I’m changing my major!” Face-time with practicing engineers, we believe, helps dispel many misconceptions plaguing the future of our profession. In a casual setting, first semester students can get answers to questions such as, “What do you actually do? Should I pay attention in Calculus? Do you like your job?” This program is part of a larger retention and career-boosting initiative including overhauling the first-year course experience and hiring student peer advisors, funded in part through NSF-STEP.

Our industrial mentors commit to 9 hours (including drive time) for the year including: attending mentor orientation, providing student feedback, attending two informal student meetings (with the 6-8 member FIGs), and completing a feedback survey. Several optional activities for interested mentors include giving class presentations, electronic mentoring, and reviewing first-year student team design presentations. In this 2011-12 pilot year, 9 mentors are connected with FIG groups of approximately 7 students each.

This paper details the logistics and challenges of starting up this mentoring program, and presents qualitative and quantitative assessment results, with the intention of contributing our experiences and materials to the dialogue on retention initiatives. Details include: creating conducive mentoring groups, identifying and recruiting ideal mentors, empowering student peer advisors to “own” the relationship (and the accompanying logistics), jumpstarting conversations with first-year students and mentors, and program results. Results include data from one focus group and surveys of first-year students, student peer advisors, faculty mentors, and industrial mentors. Results to-date are very encouraging and include recommended improvements.

## 1 Introduction and Background

### 1.1 Characteristics of LeTourneau University

LeTourneau University is a private university offering over 60 academic programs, including engineering and engineering technology, the aeronautical sciences, business, education, the liberal arts, and sciences. The School of Engineering and Engineering Technology (SEET) is the largest of the five academic divisions of the university. Of the 1400 undergraduate students on the campus, nearly 500 of them are matriculated in the SEET, which offers two undergraduate Bachelor of Science degrees: Engineering and Engineering Technology. The Engineering degree provides six concentrations: *biomedical, civil, computer, electrical, materials joining, and mechanical*, while the Engineering Technology degree provides five concentrations, *aeronautical-electrical, aeronautical-mechanical, electrical, materials joining, and mechanical*. All of these concentrations build upon a common core of general education and technical coursework.

### 1.2 *First-Year Initiatives for Retention Enhancement (FIRE)*

Our school engineering graduation rates have been declining despite steadily increasing enrollment. Retention and graduation rates declined to significantly subpar levels, motivating an internal study<sup>1</sup> of underlying causes. Analyses of performance and predictor data, as well as surveys of the literature and of non-retained SEET students, produced several recommended actions based on documented best practices. An ensuing NSF STEP grant was obtained to aid in the implementation of these initiatives. The primary goal of *First-Year Initiatives for Retention Enhancement (FIRE)* is to increase the school's graduation rate from its recent five-year average of 42% to an improved five-year average of 65%. This will put us above the average graduation rates of undergraduate engineering programs across the nation. Reported numbers vary from one source to another, but a national average of about 55% is in reasonable agreement with the sources identified.<sup>2,3,4,5</sup>

All of our approximately 130 “First time in any college” (FTIAC) freshmen are the focus of the SEET's retention improvement efforts. The SEET's multifaceted initiatives for improving retention include several best-practice components, namely:

- 1) exposure to engineering practice through two new courses employing multidisciplinary projects<sup>6</sup>, *presentations by practicing engineers*, presentations by students involved in co-op education, and presentations by senior capstone design project students;
- 2) the development of the faculty mentoring program for first-year students;
- 3) the development of a peer advisor mentoring program for first-year students;
- 4) the development of an *industrial mentoring program* for first-year students.

We are implementing all four initiatives, and this paper focuses on initiative #4, industrial mentoring.

### 1.3 *Other Industrial Mentor Programs*

Freshman mentoring programs usually rely either on electronic communications (usually for individual students) or live face-to-face mentoring (usually involving groups of students.) Our program uses face-to-face mentoring of groups, but examples of both types are described below for background.

#### ***Electronic Industrial Mentoring (One-on-one)***

Several electronic mentoring programs have emerged with the growth of internet-based communication. One of the leaders in this movement has been MentorNet<sup>7</sup>, an e-mentoring program originally launched in 1997 as a retention strategy for women studying engineering and related sciences<sup>8</sup>. Soon after its inception, MentorNet expanded to serve the needs of the other underrepresented groups in STEM areas and is now available to any eligible student on more than 75 affiliated campuses. “An increased confidence in their success in science or engineering” is the top benefit cited by the more than 30,000 students who have participated in this program. Over 90% of participants would recommend this program to others.

North Carolina Agriculture and Technical State University has leveraged MentorNet to create their own electronic mentoring program, AggiMentor, to increase student retention in their

STEM disciplines<sup>9</sup>. This program matches incoming freshmen with alumni mentors in a similar career field. Of the 101 students that voluntarily participated in the first year, over 50% indicated e-mentoring is providing the support they need to remain in their field and succeed.

An E-Mentoring program at Northeastern University COE consists of clubs<sup>10</sup> with 3 to 6 members from multiple generations who communicate to each other with email. The club participants include Northeastern University women alumni, Northeastern University COE female students (freshman and upper-classman), and girl scouts. Once a week, email correspondence takes place focusing on a question posed by a moderator. In addition to the email mentoring, a bi-monthly social meeting takes place to foster personal interaction. More of this personal meeting time was the improvement most asked for in a follow-up survey of participants.

### ***Face-to-Face Industrial Mentoring (Groups)***

Face-to-face industrial mentoring programs are most often implemented between a mentor and a group of students rather than one-on-one. In some cases, such as at the University of Florida, the student group is comprised of both freshmen and upper classmen within an academic department<sup>11</sup> with industrial mentors from the same field of engineering. The mentoring interaction takes place through monthly meetings consisting of a short presentation by the mentor and then an open time for questions and sharing.

While Indiana Institute of Technology does not have a direct industrial mentor program, it does provide freshman students an opportunity to interact with practicing and retired engineers through an extra-curricular project<sup>12</sup>. The Department of Electrical and Computer Engineering has freshmen participating with upperclassmen and engineers from industry in the design and simulation of an electronic payload for a rocket. It is anticipated that this project participation with engineers will have a positive impact on retention and persistence.

One of the keys to successful retention programs is helping the freshman develop a personal identity as an engineer. In light of this, Arizona State University has developed a three-hour Freshman career exploration evening event<sup>13</sup> in which over 60 practicing engineers representing about 35 companies interact with the entire freshmen engineering class. All students in freshmen engineering student success courses are encouraged to attend. Program organizers hope this industrial mentor interaction helps freshmen self-identify as an engineer, thus strengthening their persistence and retention.

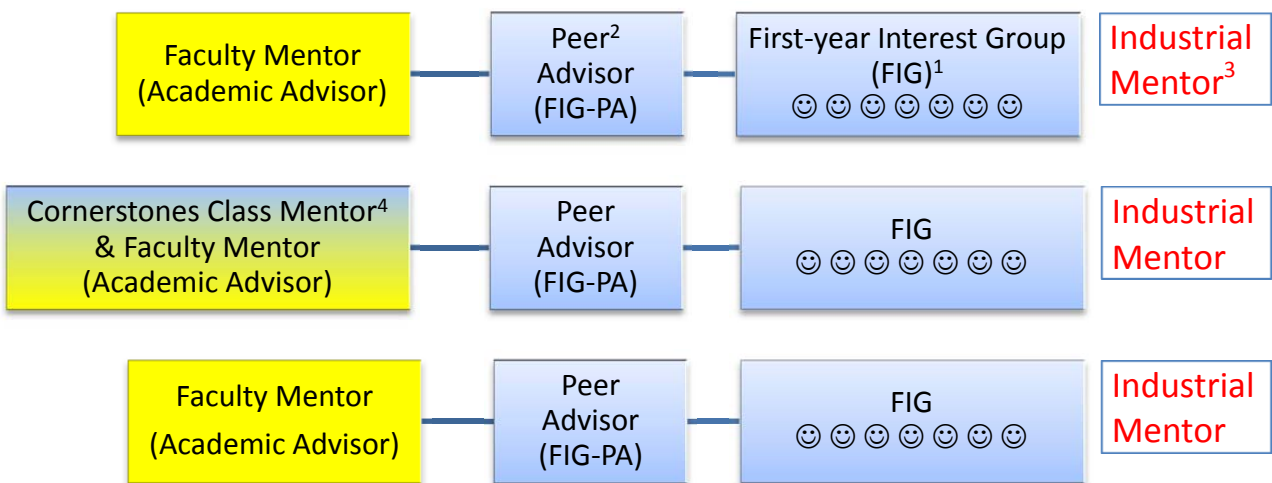
This paper describes our pilot of a face-to-face industrial mentoring program with a focus on small group interaction, as described in the next section.

## **2 Piloting an Industrial Mentorship Program**

Our first-year retention initiatives strive to help students “survive and thrive academically, socially, and spiritually.” The industrial mentor program primarily focuses on helping students “thrive academically” by enhancing *understanding* of engineering careers and *motivation* to work towards them. In this 2011-12 pilot year, 9 mentors are connected with groups of approximately 7 first-year students each. Logistics and results are detailed in the following subsections.

### 2.1 Creating Conducive Mentoring Groups (Exhibit 1)

Each intro-to-college “Cornerstones” class of ~20 students from similar majors has three sub-groups of 6-8 students each termed “First-year Interest Groups” (FIGs). Each FIG group has a faculty mentor, peer advisor, and (when fully implemented) an industrial mentor. The faculty mentor is also the academic advisor of the FIG group. One of the engineering faculty mentors teaches the Cornerstones class intended to foster intellectual, spiritual, and social development, along with “survival” topics such as time tracking and study skills. The peer advisors (FIG-PAs) are carefully recruited, screened, and trained by the campus achievement center to catalyze intensive relationship-building with and among the FIG group. Peer advisors are compensated for 6-8 hours per week, averaging \$2,000 each in yearly wages including overhead. FIG participants meet with their peer advisor every week alternating between individual and group meetings, providing an ideal sub-group to link industrial mentors with.



*Exhibit 1: Three “First-Year Interest Groups (FIGs)” in each Cornerstones Class of ~20 Students.*

*[1:FIGs are 6 to 8 students, 2:FIG Peer Advisors are older students,*

*3:FIG Industrial Mentors are local practicing engineers linked to one FIG.]*

### 2.2 Identifying and Recruiting Ideal Mentors

With the mentoring initiative goals in mind, we used existing relationship networks to recruit engineers believed to have the following characteristics:

- Local practicing engineer
- Program alumnus (strongly preferred)
- Technical concentration matching the student group
- Strong, vibrant communicator
- Willing to donate time

We emphasize to potential mentors a carefully planned mentoring program representing an efficient investment of their time and energy. Exhibit 2 lists the fall schedule presented to mentors requesting a minimum of 6 hours in the Fall including travel time. **Appendix A** contains the entire program description, requesting a 9 hour investment for the total academic year including: attending mentor orientation, providing student feedback, attending two informal

student meetings (with the 6-8 member FIG), and completing a feedback survey. Student group meetings could consist of: a discussion meeting on campus, snacks or meals in the home of a professor or mentor, a meal in the campus café, or a workplace tour. Several optional activities are suggested if mentors choose to invest more than 9 hours.

<b>FALL</b>	<b>Hours</b> (Min-Max)	<b>Event</b>
Aug.	2-2	<b>Mentor Orientation</b> –new industrial mentors: <b>August 19<sup>th</sup> 3-4PM Glaske C105</b>
Aug/Sept Sept./Feb.	0-6 0-2	<b>Class Presentation</b> - volunteer mentors only Develop class introduction presentation (“Hi, I’m an engineer and at work I ...”) Class introduction presentation (30 minutes in Fall IEPI OR Spring IEPII)
Sept.	2-3	<b>Student Feedback</b> - on bullet list of “Why I want to be an Engineer” (CS) (in person or via email)
Sept/Oct.	0-2	<b>Observe Lab Group</b> – example: students conducting tensile testing
Sept-Nov.	2-4	<b>Student Group Meeting*</b> - ideas listed below for informal meetings
Aug-Dec	0-3	<b>Electronic Chat</b> - student questions via email or Facebook group
<b>FALL TOTAL</b>	<b>6-22</b> (Min-Max)	

*Exhibit 2: Fall Schedule Presented to Industrial Mentors (Spring in **Appendix A**)*

Of the 10 potential mentors contacted by phone, after a follow-up email containing the program description in Appendix A, 9 mentors agreed to participate and 5 attended a kick-off meeting. The kick-off meeting was designed to inform, motivate, and connect mentors. The meeting was run by the director of student peer advisors (the first author) and included a Dean’s welcome and motivational words from a star student. Future mentor program kick-off meetings will include all student peer advisors in order to form immediate connections with the industrial mentor assigned to their particular group.

### *2.3 Empowering Student Peer Advisors to “Own” the Industrial Mentor Relationship*

The 17 engineering student peer advisors (shown as “FIG-PAs” in Exhibit 1) are supervised by an engineering professor with course release for retention initiatives known as the “FIG Director.” To maximize available resources the FIG Director chose to entrust individual student peer advisors with ownership of the relationship with their industrial mentor. Appendix B contains the email instructions to peer advisors on how to initiate contact and schedule a first meeting with an industrial mentor. Hardcopies of this assignment were also discussed in face-to-face meetings with emphasis on being respectful and courteous of industrial mentor’s time. To college students, planning one day ahead may seem excessive, but busy engineers with international travel schedules may not appreciate the last-minute invitations and schedule-changes common among informal student events.

Of the 6 industrial mentors who responded to our end-of-semester survey, 5 agreed that “The faculty and the Peer Advisor who scheduled meetings with me were respectful and courteous” while 1 respondent was neutral.

#### 2.4 *Jumpstarting Conversations among First-year Engineering Students and Mentors*

We anticipated that engineering students meeting a practicing engineer would benefit from help “priming the pump” for relevant conversations. Peer Advisors asked first-year students to complete the assignment in Appendix C describing characteristics desired in a job (such as hours per week and technical area) and three or more “questions I would like to ask a practicing engineer.” Appendix D gives example student responses. Student questions cover a wide range, including for example: working hours, amount of hands-on work, and office relationships.

#### 2.5 *Fall 2011 Mentor Meetings*

Exhibit 3 shows the matching of mentor and student majors and the meetings which took place during Fall 2011, the first semester of the pilot year. Of the 9 groups with mentors, only one failed to schedule and complete a meeting.

Group#	Student Group Major	Mentor Major	Meeting(s)
1a	Mechanical	Mechanical	Dessert night; Dinner/bonfire at mentor's home
1b	Mechanical		(no mentor)
1c	Mechanical		(no mentor)
2a	Civil	Civil	Group Meeting
2b	Civil	Civil	Café Dinner
2c	Materials Joining	Materials Join. Tech.	<i>Met with peer advisor</i>
3a	Engr. Technology		(no mentor)
3b	Design & ME Tech.	Mechanical Tech.	Café Dinner
4a	ENGR (undeclared)	Electrical	Dessert night; Group Meeting
4b	Biomedical		(no mentor)
4c	Computer Engr.		(no mentor)
5a	Electrical	Mechanical	Café Lunch
5b	Electrical		(no mentor)
5c	Electrical		(no mentor)
6a	Mechanical	Mechanical	Café Lunch
6b	Mechanical		(no mentor)
6c	Mechanical	Mechanical	Group Meeting

*Exhibit 3: Fall 2011 Industrial Mentor Meetings  
(9 out of 17 groups have Industrial Mentors)*

### 3 Results

First-year students, peer advisors, and industrial mentors all played a significant role in the collecting of data for these motivation and retention initiatives. Several assessment instruments were designed and utilized for data collection, each specific to one of the aforementioned groups. Initial data indicates that the involvement of industrial mentors with first-year students positively impacts the perceptions of first-year students regarding engineering as a career choice, likely increasing motivation and retention.

### 3.1 First-Year Student Survey Results (Exhibit 4)

The first-year students were asked to complete an online survey regarding experiences in the FIG. Questions concerned interactions with peer advisors, faculty mentors, and industrial mentors. Four items specifically related to industrial mentorship. Regarding direct interaction, 56% of respondents reported seeing their industrial mentor at one or two FIG events, consistent with the fact that 8 out of 17 FIG groups were not assigned an industrial mentor in this pilot year. 4% (3 respondents) indicated seeing their industrial mentor at 4 or more events, indicating survey confusion or error since no mentors met with groups more than 3 times. The exhibit below includes the responses of the first-year students who reported one or more meetings with the industrial mentors (data from non-participants are excluded from the statistics):

Survey Item	M	SD	% SA/A	% N	% D/SD
Seeing my FIG's industrial mentor has helped me better understand what an engineer does.	3.63	.94	58.4	31.3	10.3
My industrial mentor has helped me better understand whether or not engineering/engineering technology is the right major for me.	3.49	.92	53.1	36.7	10.2
My industrial mentor has increased my motivation to succeed in engineering/engineering technology.	3.63	.86	59.2	30.6	10.2

*Exhibit 4: First-Year Student Survey Results (5=Strongly Agree)*

Survey items were asked on a 5-point Likert scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree). First-year students indicated significant agreement (53% or greater) that industrial mentors helped them understand engineering duties and personal career fit, and 59% agreed the mentorship increased their motivation to succeed in engineering. The following comments were added by students:

- It [meeting with the industrial mentor] has helped me to know what I really want to do.
- I have a fairly good idea of what a Civil engineer can be involved in now, yet am still not positive if going so in depth in engineering is for me.

Students viewed the interactions with the industrial mentors positively, and we believe that a higher number of interactions during a semester would increase the size of the effect.

### 3.2 Peer Advisor Focus Group and Survey Results

Peer advisors play a significant role in motivating and retaining students. Peer advisors serve as a bridge between first-year students and faculty mentors, and between the university and industrial mentors. Peer advisors for FIGs with industrial mentors reported a positive experience with the retention initiatives in general, unanimously agreeing or strongly agreeing with the following: "FIGs help students gain a more accurate understanding of the field of engineering," "FIGs help students develop successful life skills and study habits," and "individual as well as group meetings between PAs and first-year students provide benefits to the students." The comments below are from peer advisors specifically regarding industrial mentors:

- The students really appreciated and like the industrial mentor. It seemed to have benefited both them and me a lot. The mentor was able to shed light on a lot of questions that they



had, and every one of them said that they learned a lot and really enjoyed talking to the mentor.

- All of my advisees really enjoyed having the industrial mentor meeting. They were able to glean a lot of information from him, as well as very good advice.
- My mentor was exceedingly helpful, the insights he provided were great.
- It helped my FIG see what they are in school for and why they are studying hard. It let them know that all the adversity is worth it. It helped them see what type of things engineers do and how much people interaction is required to be an engineer.

One Peer Advisor Survey question related to the number of interactions between the students and the industrial mentors. Of the FIGs assigned an industrial mentor, 75% of the groups met with the mentor once and 25% met twice during the semester. Peer advisors were also asked if industrial mentor (practicing engineer) meetings benefited the FIG. In response, 27% strongly agreed that the meetings were beneficial; 20% agreed; 7% expressed a neutral response, indicating uncertainty or the possibility that it may be too soon to tell; 47% answered “not applicable,” indicating that their group had not been assigned an industrial mentor (in this pilot year, 9 out of 17 FIG groups were assigned mentors.) *Of those respondents who had a mentor, 88% (7 out of 8) agreed or strongly agreed the industrial mentor meetings were beneficial.*

In addition to the survey, peer advisors also participated in a focus group with the faculty “FIG Director.” Results from those meetings indicated overall that the experience with the industrial mentors was positive. Peer advisors said things like, “[It] definitely helped my Freshmen see what was likely to be an engineering career.” Students appeared to have enjoyed the interactions with the industrial mentors, and they made several suggestions to improve the experience. Students suggested having more meetings with the mentors, having mentors present in a class, taking field trips to the mentors’ job sites, and having a meeting with the mentors to kick off the semester. A few peer advisors indicated difficulty in scheduling with the industrial mentors and more guidance overall for the interaction, but the experience was still positive.

### 3.3 Industrial Mentor Survey Results (Exhibit 5)

Of the 9 industrial mentors, 6 responded to our online feedback survey. Industrial mentors participated in a variety of activities with the students including meals at the campus cafeteria (50%), a student dessert night (17%), group meetings on campus (not at the cafeteria) (33%), and group meetings off campus (17%) (the total is greater than 100% due to mentors being involved in more than one type of event.)

Of the mentors who participated in the survey, 100% agreed or strongly agreed that the mentoring program should continue, and they wanted to continue serving as mentors in the future. One other interesting statistic was that 100% of mentors agreed or strongly agreed that in the long run, both the individual and their company would benefit from them serving as an industrial mentor. Overwhelmingly, industrial mentors indicated that the experience was positive in terms of benefits to both the students and the industrial mentors. One mentor even reflected upon personal experience and the significance of meeting with a professional as motivation for continuing the major and gaining confidence as a student. Mentors did comment that the challenge

of meeting together is an issue of timing and availability. Industrial mentors commented on the positive and respectful attitudes of the students with whom they interacted. One recommendation for improvement revolved around the limited attempts made by peer advisors to contact the industrial mentors. The exhibit below contains the Industrial Mentor Survey results.

Survey Item	SA / Agree	Neutral	SD / Disagree
My <b>overall experience</b> as an industrial mentor has been positive.	67%	33%	0%
I believe <b>students benefited</b> from meeting with me.	67%	33%	0%
I believe meeting with me helped students gain a more accurate <b>understanding of the field of engineering</b> .	83%	17%	0%
I <b>recommend LETU continue</b> the industrial mentor program in future years.	100%	0%	0%
<b>I would like to continue</b> to serve as an industrial mentor in future years.	100%	0%	0%
In the long run, <b>my company and I are likely to benefit</b> from me serving as an industrial mentor.	100%	0%	0%
Serving as an industrial mentor has been a <b>good investment</b> of my time.	100%	0%	0%
The faculty and the Peer Advisor who scheduled meetings with me were <b>respectful and courteous</b> .	83%	17%	0%
I would recommend serving as an industrial mentor to other practicing engineers (if they are a good fit for it).	100%	0%	0%

*Exhibit 5: Industrial Mentor Survey Results*

## 4 Conclusions and Future Work

First-year students indicated 53% or greater agreement that industrial mentors helped them understand engineering duties and personal career fit, and 59% agreed the mentorship increased motivation to succeed in engineering. 7 out of 8 peer advisors linked to a mentor agreed or strongly agreed the industrial mentor meetings were beneficial to first-year students. The industrial mentors themselves unanimously (100%) agreed that the mentoring program should continue, and that they wanted to continue serving as mentors in the future (they also indicated both they and their company would benefit.) These early indicators from industrial mentors, peer advisors, and the first-year students themselves are extremely encouraging regarding the value and future of the mentoring program.

### 4.1 Future Work

As expected, the first-half of the industrial mentor program pilot year has already yielded numerous insights for future improvement, including:

- Introduce peer advisors and industrial mentors at a kick-off meeting, and make arrangements for all industrial mentors to attend faculty dessert night with their students.
- Work with peer advisors very early in the semester to put 2 mentor meetings on the calendar so students and mentors can all plan ahead. This will reduced missed opportunities such as invitations to dinner in the mentors home and workplace tours.

- Provide peer advisors more detailed guidance in advance regarding scheduling and conducting meetings between industrial mentors and the first-year students
- Share motivational success stories of mentor relationships to enhance the motivation of both students and mentors to invest in these relationships.

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## Appendix A: Industrial Mentor Program Invitation Description

### Industrial Mentor Program Overview – LeTourneau University (v.8-6-2011)

The Industrial Mentor Program connects practicing engineers with a **“Freshman Interest Group (FIG)” of 7-10 students**. Far too many talented young minds walk away from engineering thinking, *“I don’t want to work calculus problems in isolation the rest of my life, so I’m changing my major!”* Face-time with practicing engineers helps dispel many misconceptions plaguing the future of our profession. Answers to “What do you actually do? Should I pay attention in Calculus I? Do you like your job?” go a long way.

Industrial mentors commit to **9 hours for the year** including: attending mentor orientation, providing student feedback, attending two informal student meetings (with the 7-10 member FIGS), and completing a feedback survey. Several optional activities are also listed if mentors choose to invest more than 9 hours. Time estimates listed below include some travel time.

LeTourneau is serious about cultivating world-class engineers. We are overhauling our first-year experience, hiring numerous student peer mentors, and bringing practicing engineers into the classroom - all to help first-year engineering students launch a successful career.

FALL	Hours (Min-Max)	Event
Aug.	2-2	<b>Mentor Orientation</b> –new industrial mentors: <b>August 19<sup>th</sup> 3-4PM Glaske C105</b>
Aug/Sept Sept./Feb.	0-6 0-2	<b>Class Presentation</b> - volunteer mentors only Develop class introduction presentation (“Hi, I’m an engineer and at work I ...”) Class introduction presentation (30 minutes in Fall IEPI OR Spring IEPII)
Sept.	2-3	<b>Student Feedback</b> - on bullet list of “Why I want to be an Engineer” (CS) (in person or via email)
Sept/Oct.	0-2	<b>Observe Lab Group</b> – example: students conducting tensile testing
Sept-Nov.	2-4	<b>Student Group Meeting*</b> - ideas listed below for informal meetings
Aug-Dec	0-3	<b>Electronic Chat</b> - student questions via email or Facebook group
<b>TOTAL</b>	<b>6-22</b>	

SPRING	Hours (Min-Max)	Event
Jan/Feb.	2-4	<b>Student Group Meeting*</b> - ideas listed below for informal meetings
Mar/Apr.	0-2	<b>Proposal Review</b> – review design proposals from IEPII (LEGOS) Design teams
Mar/Apr.	0-2	<b>Design Review</b> - review panel for IEPII (LEGOS) class design demonstrations
Jan-May	0-3	<b>Electronic Chat</b> - student questions via email or Facebook group
May	1-1	<b>Feedback Survey</b> – input on improving the industrial mentoring program
<b>TOTAL</b>	<b>3-12</b>	

#### **\*Student Group Meeting:**

- Attend a FIG evening study session on campus
- Snacks or meal: CS class instructor’s home, FIG Faculty mentor’s home, or Industrial mentor’s home
- Meet FIG for breakfast or lunch in campus Corner Café
- Workplace tour

**The Bottom Line?** We want to help connect our valued industrial mentors and their companies to the rich resources student engineers have to offer – whether recruiting new hires, benefiting from senior design work, or networking with faculty in our modern and dynamic campus. Also, our public relations officer is ready to help let the world know that you and your company supports community outreach by mentoring engineering students.

## Appendix B: Email Empowering Peer Advisors to Setup Industrial Mentor Meetings

**Subject:** FIGs: Scheduling FIG meeting with Industrial Mentor

Dear FIG-PA's, the draft email below will save you some time initiating a FIG group meeting with your Industrial Mentor. Contact info is in a separate email. Please do your best to have a meeting time and date agreed upon by Weds 9/21, ideally with the meeting occurring during the following week (6<sup>th</sup> class week.) Many mentors travel frequently and we need to contact them early to work with their schedules. I greatly appreciate you handling this important relationship in a professional way! – Dr. G.

### **Instructions to Peer Advisor:**

- Customize the email below as you think best, keeping in mind professional communication and respecting the industrial mentor's very limited and valuable time (likely worth well over \$50/hr to their employer.)
- **FIG-PA policy is to always CC (or BCC) the industrial mentor coordinator [EmailRemoved@edu.edu](mailto:EmailRemoved@edu.edu) on this and all logistical messages FIG-PA's send to the industrial mentor.** If appropriate, CC your faculty mentor as well.
- If take your industrial mentor to the Corner Café, turn in the meal receipt to Dr. G. to be reimbursed. If you wish to reserve one of the glass-walled rooms, email your confirmed time and date to [EmailRemoved@edu.edu](mailto:EmailRemoved@edu.edu) at least 48 hours in advance.
- You are the primary contact with the industrial mentor, and you are trusted to handle this valuable relationship well. The mentor can be an excellent resource for you and your students, possibly helping you land an internship or job since you are bound to make a good impression on them, right?

### **EMAIL SUBJECT:** Industrial mentor – student group meeting

Hi, Dr. \_\_\_\_\_ gave me your contact information since I am the peer advisor for a group of first-year engineering students. Thank you for volunteering your time to serve as an industrial mentor for these young students! I look forward to setting up a meeting where my students can talk with you in a casual setting. We know you are busy and we will work with your schedule.

Our next bi-weekly FIG meeting, for example is:

<fill in time, date, location>

If you prefer a meal, we would love to buy you a meal at the Corner Café. Here are some times most of my students and I are available:

Breakfast: <fill in time, suggested day or days of week>

Lunch: <fill in time, suggested day or days of week>

Dinner: <fill in time, suggested day or days of week>

Please let me know if any of these options work well for you, or if you have a different suggestion.

I check this email address regularly, but also feel free to give me a call at <optional: phone number here.>

Sincerely,

<your name here>

## Appendix C: Electronic Assignment to Introduce Students to Industrial Mentors

**INSTRUCTIONS:** Email the completed form below to your FIG-PA within four days. Your industrial mentor will review this as preparation for your group meeting. - Dr. G.

My Name:

My FIG-PA's Name:

### **This is the kind of job I think I may want:**

- Proportion of desk to shop or field work:
- Amount of customer interaction:
- Hours/week:
- Type of position (e.g. sales, manufacturing, design, consulting ...):
- Technical areas (e.g. aerospace, HVAC, machines ...):
- Salary range:
- Size of company:
- Anything else?:

### **Questions I would like to ask a practicing engineer (three or more):**

- 1.
- 2.
- 3.

### **EXAMPLE (please delete this when sending to PA):**

My Name: *Joe M. Engineer*

My FIG-PA's Name: *Jane Smith*

### **This is the kind of job I think I may want:**

- Proportion of desk to shop or field work:  
*80% office work, 20% shop work*
- Amount of customer interaction:  
*I would like to interact with the end user of the products and systems I am designing or maintaining.*
- Hours/week [40 hr/wk is 8-5 Mon-Fri]:  
*40-50 hrs/wk, mostly regular hours w/ occasional late nights or weekends as needed*
- Type of position (e.g. sales, manufacturing, design, consulting...):  
*Design of products and systems*
- Technical areas (e.g. aerospace, HVAC, machines ...):  
*Machine design, mechatronics, thermal-fluid systems (including HVAC),*
- Salary range:  
*\$50-60k*

- Size of company:  
<100 people ... somewhere pretty flexible where I can work in a variety of positions
- Anything else?:

**Questions I would like to ask a practicing engineer (three or more):**

1. *What college classes or activities helped you the most in your career?*
2. *Does it get boring doing the same thing over and over again?*
3. *If you have a family, how does your career affect them?*



## Appendix D: Sample First-year Student Questions Provided to Mentors Before Meetings

### **This is the kind of job I think I may want:**

- Proportion of desk to shop or field work:  
*70% office work, 30% shop work*
- Amount of customer interaction:  
*I would like to interact with the customers of the product I am designing most of the time.*
- Hours/week:  
*40hrs a week with maybe a few extra hours at home to work on larger projects.*
- Type of position (e.g. sales, manufacturing, design, consulting ...):  
*Design and improving the products.*
- Technical areas (e.g. aerospace, HVAC, machines ...):  
*Mechanical machines.*
- Salary range:  
*Starting salary between \$50,000 and \$70,000.*
- Size of company:  
*Medium size, so I have the small aspect when you know a lot of people and its a family. But I also like the larger aspect when there are a larger group of people and jobs.*

### **Questions I would like to ask a practicing engineer (three or more):**

1. How much hands-on work do you do as an Engineer?
2. What is your favorite thing about being an Engineer?
3. How many times do you work on projects as a group?

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### **This is the kind of job I think I may want:**

- Proportion of desk to shop or field work: 40% office work, 60% shop work
- Amount of customer interaction: Not much. Just a little bit.
- Hours/week: 40+ hours
- Type of position (e.g. sales, manufacturing, design, consulting ...): Design and manufacturing
- Technical areas (e.g. aerospace, HVAC, machines ...): machines
- Salary range: \$60k-120k
- Size of company: somewhere pretty flexible where I can work in a variety of positions.

### **Questions I would like to ask a practicing engineer (three or more):**

1. Do all engineers get to do some sort of manufacturing?
2. What should I expect going into the field of design?
3. What is your favorite part of your job?

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**This is the kind of job I think I may want:**

- Proportion of desk to shop or field work: 60% shop, 40% desk
- Amount of customer interaction: I would not like to work with the customer as a sales person, but I would like to interact with them to get their feedback on the product I am building or designing. Also, I would like to know how the product works for them after it is done.
- Hours/week: Standard 40 hour week is fine, with vacation time somewhere in there
- Type of position (e.g. sales, manufacturing, design, consulting ...): I would like it to be design or manufacturing. I would actually like to both design and build the product
- Technical areas (e.g. aerospace, HVAC, machines ...): aeronautical (designing/building aircraft)
- Salary range: \$50k +
- Size of company: Small would be best, but if it was a big company, I would like to work in a smaller branch or with a small group of people
- Anything else?: If there was a job where I designed, built, and flew the aircraft, that would be even better!

**Questions I would like to ask a practicing engineer (three or more):**

1. How common is it that an engineer builds the machine he designs?
2. What is a common ration of desk to shop work for an engineer?
3. How extensive does computer knowledge have to be for a mechanical engineer? (as in do they have to know programing, etc.)

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**This is the kind of job I think I may want:**

- Proportion of desk to shop or field work: 60% desk, 20% shop, 20% feild
- Amount of customer interaction: I would like to stay conected with the costumer to ensure I am meeting their needs
- Hours/week: 40+
- Type of position (e.g. sales, manufacturing, design, consulting ...): Manufacturing or Design
- Technical areas (e.g. aerospace, HVAC, machines ...): Renewable Energy
- Salary range: doesn't matter, but I would consider the highest offer more strongly
- Size of company: doesn't matter but would like to work various positions

**Questions I would like to ask a practicing engineer (three or more):**

1. What is your current salary?
2. How much do you interact with your boss?
3. Do you work Sundays?

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**This is the kind of job I think I may want:**

- Proportion of desk to shop or field work: 80% desk, 20% field
- Amount of customer interaction: I would like to stay conected with the costumer to ensure I am meeting their needs and staying within scope. I wouldn't mind a management position.
- Hours/week: 50+ (until i get married, then maybe less, still over 40)

- Type of position: design consulting work. so i could have a variety of projects to work on. but a specialty area that I was better in.
- Technical areas: Energy production eventually but starting out with power protection. Probably for municipal works and refineries. (I'm an electrical engineering student, not mechanical.)
- Salary range: It would be nice to start at over 50k but if the company was one that I liked and where I saw potential to grow into a better position I would be more willing to start lower. I really just need to be able to pay off my student loans in a timely manner.
- Size of company: a small company where I could get involved quickly and where I could work on different aspects of a job. (20 to 40 people total. including draftsmen designers and engineers)

**Questions I would like to ask a practicing engineer (three or more):**

1. How did you get the job you are in now? Was it your first? Any internships?
2. Describe what you do for your company? How much interaction happens between you and your clients?
3. When do you go into work in the morning? and how often do you work weekends?

## Appendix E1: Assessment – Industrial Mentor Survey Fall 2011

Please tell us how the industrial mentor program is motivating and informing new students about engineering career. Suggestions will be greatly appreciated.

- **Please select which Peer Advisor facilitated your meeting with the students.**  
[Student Names Removed]
- **Please select all of the activities below that you participated in with students.**
  - ☐ Meal at the campus cafeteria
  - ☐ Student dessert night
  - ☐ Group meeting on campus (not at the cafeteria)
  - ☐ Group meeting off campus
  - ☐ Workplace tourOther: \_\_\_\_\_
- **About how many students total did you have contact with one or more times?**  
0-3, 4-7, 8-12, 13-20, 20+
- **My overall experience as an industrial mentor has been positive.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- **I believe students benefited from meeting with me.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- **I believe meeting with me helped students gain a more accurate understanding of the field of engineering.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- **I recommend LETU continue the industrial mentor program in future years.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- **I would like to continue to serve as an industrial mentor in future years.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- **In the long run, my company and I are likely to benefit from me serving as an industrial mentor.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- **Serving as an industrial mentor has been a good investment of my time.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree  
**Comments:** \_\_\_\_\_
- **The faculty and the Peer Advisor who scheduled meetings with me were respectful and courteous.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree  
**Comments:** \_\_\_\_\_
- **I would recommend serving as an industrial mentor to other practicing engineers (if they are a good fit for it.)**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- **I suggest the following modification or additions to improve the industrial mentor program:**  
\_\_\_\_\_

## **Appendix E2: Assessment – Peer Advisor Focus Group and Select Survey Questions**

### **FIG-Peer Advisor Focus Group Questions**

Conducted Nov. 7<sup>th</sup> & 9<sup>th</sup> by Engineering FIG Director in three separate groups of 3-7 each.

Stated FIG goals: help students survive and thrive academically, socially, and spiritually.

Questions:

**(1) FIG Individual meetings (between peer advisor and individual first-year students)**

- + What was it like?
- + How effective was it?
- + What should we keep?
- +Change?

**(2) FIG Group Meetings**

- + What was it like?
- + How effective was it?
- + What should we keep?
- +Change?

**(3) FIG Industrial Mentor Meetings**

- + What was it like?
- + How effective was it?
- + What should we keep?
- +Change?

### **FIG-Peer Advisor Survey Questions Related to Industrial Mentors**

- **INDUSTRIAL MENTOR (practicing engineering) meetings benefited my FIG.**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree  
**Please explain:**
- **Industrial mentor (practicing engineer) meetings occurred with my FIG this semester approximately this many times:**  
0, 1, 2, 3, 4 or more
- **What suggestions would you make for FIGS in the future?**