



Study on Success of UCF Engineers in Industry

UCF College of Engineering and
Computer Science
Dean's Advisory Board

Premise

- Discussions at November Board meeting led to chartering group to look at preparedness of graduates to meet the needs of business
- Anecdotal evaluation suggests that more than an insignificant number of graduates come into the workforce and either are incapable or unwilling to perform the tasks required by industry (both skill base and work environment/life balance)
- Team formed and discussed methods of bounding issue and developing methods to obtain data for purposes of quantification and feedback to college

Team

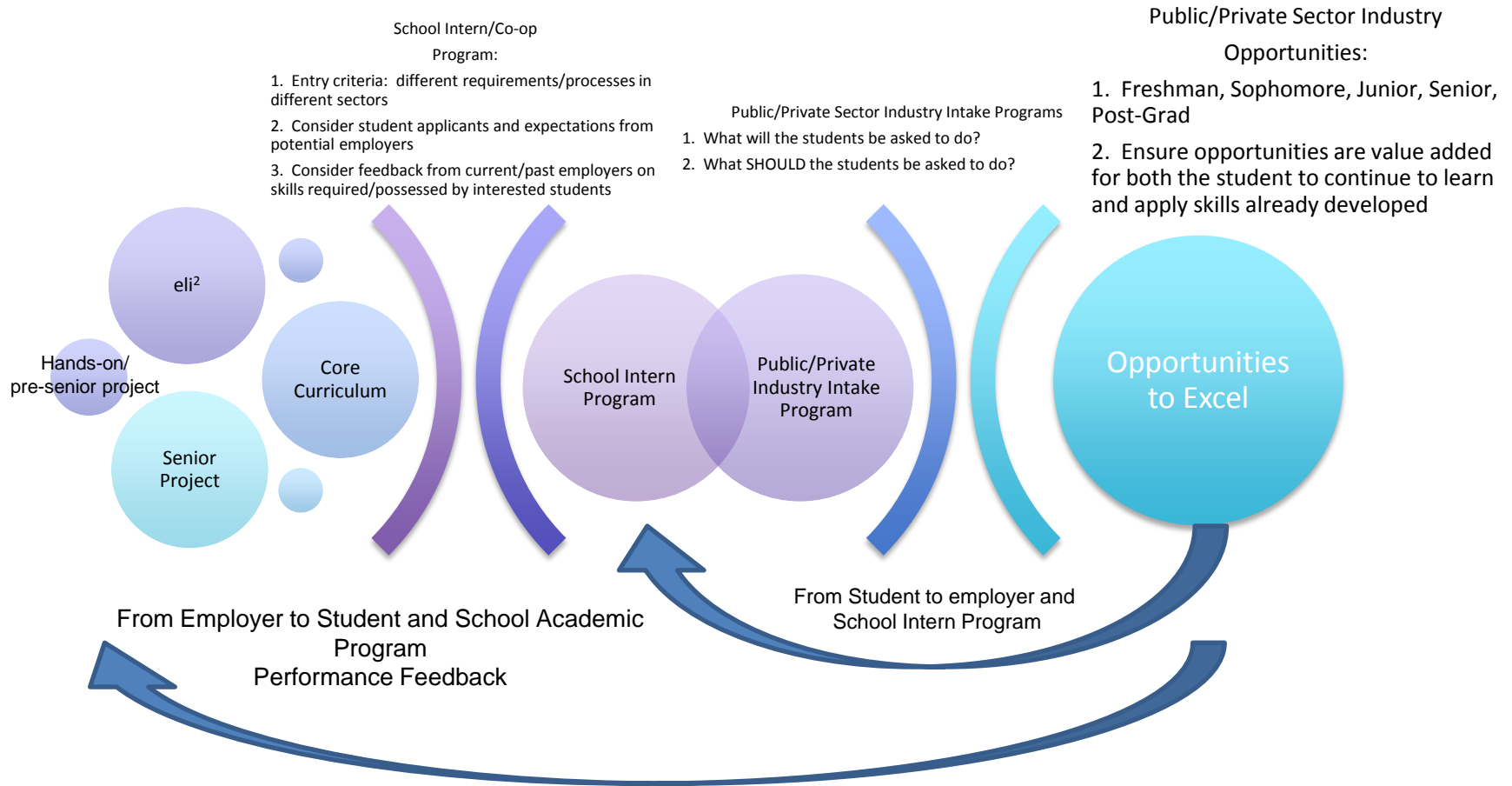
- Mike Sarpu – Lockheed Martin
- Pat Simpkins – NASA
- Sonserae Toles - Siemens
- Robin Knight - UCF

Taxonomy of Issues

Are UCF Engineering graduates successful in the workplace?

- Measures of effectiveness of education
 - Hiring rates – quantitative
 - Success in Workplace – quantitative/qualitative
 - Ability to perform work at necessary quality level
 - Ability to integrate into workforce
 - Career Success
 - Willingness to do what industry needs
- Data Sources
 - Surveys
 - College Data
 - Student Data
 - Employer Data
- Potential areas of impact within program
 - Recruitment –who enters the program
 - Acceptance – where do we set the bar
 - Curriculum – what do we teach
 - Activities – what other opportunities are provided
 - Progression - how do we measure competency and maintain standards of performance/advancement
 - Graduation – what is the exit criteria

Closed Loop Nature of Programs and Industry



Example of Decomposition of Performance Management Systems Element of Cycle

For example:

Performance Management Systems
Feedback Systems

1. From Student to employer and School Intern Program

Does the student have an opportunity to provide feedback to employer?
Does student have opportunity to provide feedback to School Intern Program?

2. From Employer to Student and School Program

Is there a process in place for employer to provide performance evaluation AND strengths and weaknesses to student AND School Intern Program so that the school program can do the best job possible of matching skills to opportunities?

3. From Employer to School Academic Program

Is there a process to provide direct feedback to the CECS on the proficiency of their students at various points on their learning journey?

Research Approach

- Developed a survey to give to students and supervisors in internships as well as entry level full time hires
- Pulled data from employers (NASA, Siemens, Lockheed Martin) on various measures of performance in the workplace
- Developed a holistic view of the college, internships, industry and employment
- Identified methods to close the loop on specific skills, quality and quantity of graduates
- Included industry participants as well as select college staff to round out team

Takeaways from NASA Data

- Students want more experience in programming
- Students want to receive more experience related to developing a Concept of Operations and Verification / Validation
- Recommendations for programming based seminars
- Recommendations for seminars focused on Spaceflight

Takeaways from Siemens Data

- Students want to be equipped with skills to perform stronger analysis
- They want practical material to equip them to handle the non-technical aspects of engineering
- Students want exposure to manufacturing methods and tools
- Students would like seminars on manufacturing processes and applications
- Students want to learn how to manage projects, as well as how to innovate and prototype
- Students want more hands-on experience

Takeaways from Lockheed Data

- UCF engineering grads are in the top two performance tiers over the last three years. The data shows a positive trend.
- Majority of UCF graduates have stayed in FL and work for MFC or MST.
- Majority of UCF graduates work in Software and Systems Engineering.
- Looking at UCF hires for Expro positions shows as a good talent pool to recruit from.
- CWEP positions are rising, but the hiring rate is lower than interns.
- We hire >50% of our interns but a very low amount of our CWEP students. We have an internal target of hiring >50% for our interns but a target metric does not exist for CWEP - that program is managed by UCF.
- It is possible to look at hiring activity in comparison with other schools to understand how competitive UCF students are in the interview slates.
- UCF is the top school in producing LMC new hires.

Some Early Thoughts

- Preliminary data shows low levels of employment 6 months post graduation even in a relatively strong job market
 - How can we use feedback from internships to provide students and the college information to improve
 - We need to decide what our success criteria is – is it something beyond graduation rate?
 - With industry in a state of rapid change, are the standards of academia aligned with the needs of industry?
 - Beyond academics, do students actually understand and want to participate in the engineering field?

Some Questions for the Room

- What is the measure of success of the program?
 - Quantity of graduates vs. quality of graduates
 - General level of performance
 - Is employability a measure of the program?
- How do we ensure students understand what engineering is?
 - Do students understand what is expected of engineers in industry?
 - Are students in the program who would not be if they knew?
- Are the standards high enough?



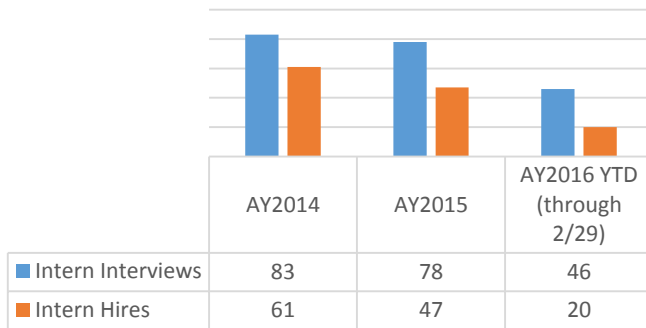
BACKUP



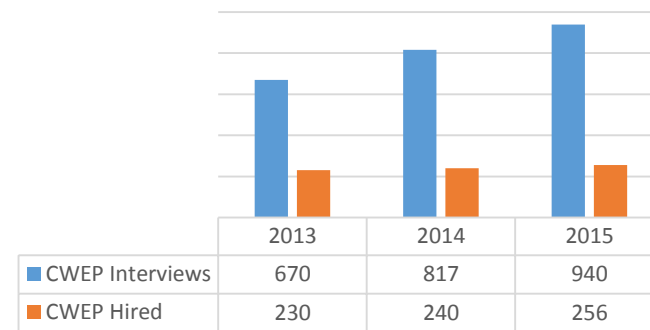
LOCKHEED DATA

Hiring Activity

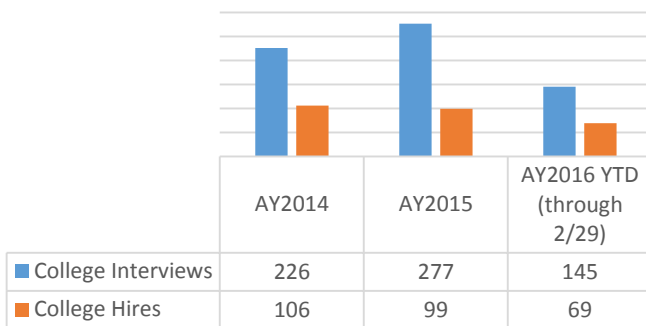
Intern Activity



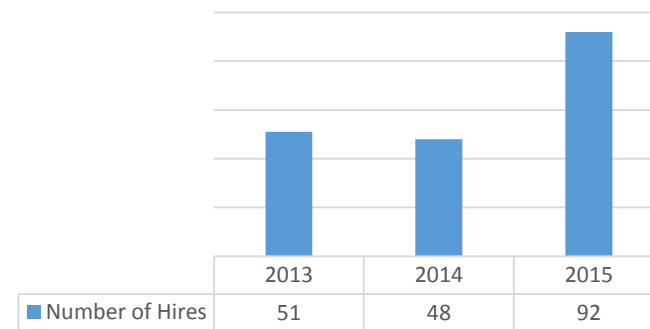
CWEP Activity



College Activity



Experienced Professional Activity



Data issue with school information in LM Careers prevents supplying Expro data

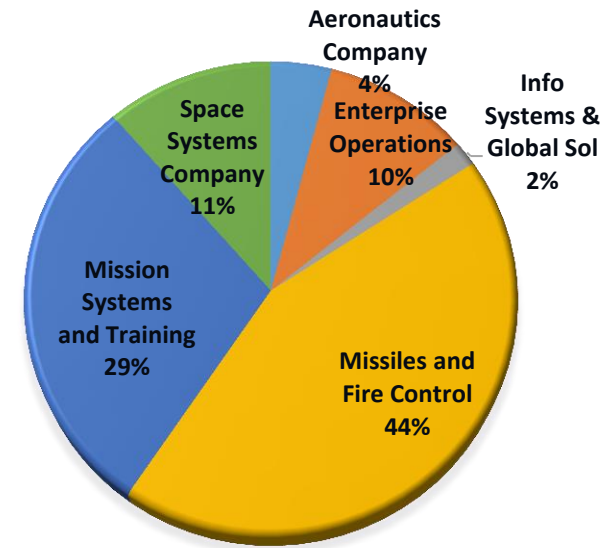
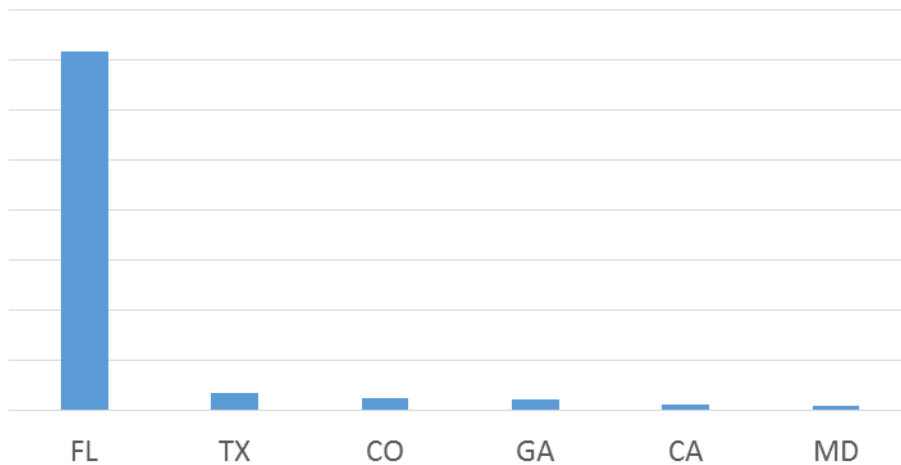
UCF engineering grads are in the top two performance tiers over the last three years. The data shows a positive trend.

Internships vs. CWEP at LMC

	Internships	CWEP
Type of Employee	Lockheed Employee	UCF Employee
Hours Per Week	40 hrs / week	25 hrs / week
Classification	Employee	Asset
Hiring Benchmark	50%	Does Not Exist
Interview Candidate Pool	Smaller	Larger

Work Locations of UCF Graduates

Work Locations



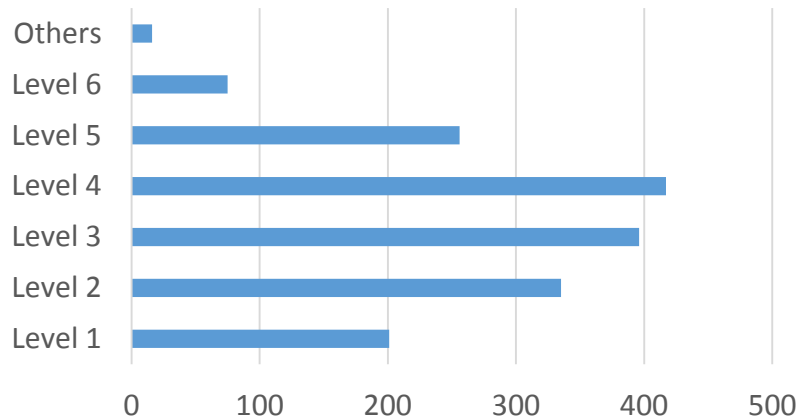
- 85% have stayed in Florida
- Texas has 4% (M&FC)
- Colorado has 3% (Space)

Majority of UCF graduates have stayed in FL and work for MFC or MST.

Industry Job Titles

UCF Grads in Engineering Roles

UCF Workforce



Top L4 (Mid-Career) Job Titles:

- Software Engineering (24%)
- Systems Engineering (19%)
- Mechanical Engineering (10%)
- Electrical Engineering (5%)
- Project Engineering (5%)
- Quality Engineering (3%)

Top Level 1 (New Employee) Job Titles:

- Software Engineering (19%)
- Systems Engineering (14%)
- Mechanical Engineering (8%)
- Manufacturing Engineering (7%)
- Quality Engineering (5%)
- Engineering LDP (5%)

Top Level 6 (Exec) Job Titles:

- Systems Engineering (16%)
- Research Engineering (13%)
- Project Engineering (12%)
- Software Engineering (9%)
- Multifunctional Manufacturing (8%)

Majority of UCF Graduates work in Software and Systems Engineering.

We Are Developing a Survey

- Survey link: http://ucf.qualtrics.com/jfe/form/SV_1NP3Muq7iGY1N0V
- Level of education, graduation date, college, major
- Rate core curriculum, industry seminars, project experience, applied skills (modeled after Siemens)
- Top 5 skills used every day
- UCF preparation to use their top skills



NASA DATA

We Surveyed Our Employees

Employees provided suggestions and feedback in the following areas:

1. Curriculum requirements (new courses or revision of existing courses)
2. Industry specific seminars or lectures
3. Project experience
4. Applied skills training

Responses: Curriculum Requirements

- (COP 4311C) Focus more on Agile/Scrum methodology and spend 1-2 weeks focusing on git only. Setting up a repository, creating branches, merging branches, what a remote branch is, feature branching, rollback, etc. This ideally would include a homework assignment or lab.
- (COP 4710) Needs a major update in material. Still using html and PHP to access databases. Needs an update to possibly move to entity framework or a different language. PHP is still commonly used in the real world its just a pain and hasn't arisen in my time at NASA. Professor also asked us to turn in program on a CD.
- Computer programs as C should be a required during the first year in order to students to have better understanding of MATLAB, MathCad programing.

Responses: Industry Seminars

- CS based seminars for students would be great. Optional seminars in C#, .NET, and Angular JS would be great for aspiring developers.
- Spaceflight

Responses: Project Experience

- Concept of Operations and Verification and Validation concepts should be emphasized during Senior Design I in order to students to have better organization, responsibilities and good results.

Responses: Applied Skills Training

- Students should not have any requirements to take Pro/E courses or SolidWorks in order for them to use them during their first semester.
- Python programming, Excel VBA, MathLAB, MathCAD

Responses: Other Suggestions

- For the most part the CS program was pretty great and prepared me adequately for my career at NASA. The core concepts like CS1 and discrete were taught/delegated to me efficiently enough for me to be successful here.
- Emphasis about the importance of programming knowledge is being neglected at UCF. Although MATLAB and Mathcad are taught during the first year of college, students do not pay attention to these courses due to a misconception that they might never need it. Most students do not have a basis on MATLAB, or other programs. They find themselves borrowing codes from other students during their senior years.



SIEMENS DATA

We Surveyed Our Employees

Employees provided suggestions and feedback in the following areas:

1. Methods for technical development
2. Curriculum requirements (new courses or revision of existing courses)
3. Industry specific seminars or lectures
4. Project experience
5. Applied skills training

Responses: Technical Development

- More 3D modeling software
- Greater emphasis on analysis (FMEA)
- Analysis is more relevant than modeling, as you may model once, but you analyze the model multiple times
- An “Engineering Administration” course
- A focus on the non-technical side of engineering.

Responses: Curriculum Requirements

- Mandatory manufacturing class
- Review selection of manufacturing methods (considering pros and cons)
- Review tolerances achievable with different manufacturing techniques
- Practicing with manufacturing and assembly of components with a stack-up
- Design for manufacturing and cost

Responses: Industry Seminars

- What to expect from the workplace
- How to conduct yourself in the workplace
- Better advertising of industry seminars
- Better scheduling of industry seminars (they should not conflict with class)
- Real-life applications and processes

Responses: Project Experience

- More project management – forcing students to be the project manager
- Focus on innovation and creation of prototypes
- Scheduling and buffering
- Organizational methods (Kanban, scrum, etc.)

Responses: Applied Skills Training

- Machining in general
- Understanding of how different tools work
- Hands-on time in the machine shop
- Software interfacing (macro writing, coding, formatting input files)

Responses: Other Suggestions

- More coursework that has to do with project management
- How to work within a team