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|  |  | Classroom-based Internship w/mentoringHigh Technology ManufacturingMay, 2017 |



**COURSE DESCRIPTION**

The Classroom-based Internship in Manufacturing is designed provide 1) fundamental job skills and 2) specific job knowledge to students interested in attaining a skilled labor position within the industry. The skilled labor shortage in the US has been well documented and it is the intent of courses like these to provide students with the skill sets required to enable their success in both attaining and excelling in the work environment of their choosing. The course is taught with equal emphasis on soft skills (working in teams, ability to manage stress, ability to communicate effectively, work ethic), training in industry standard practices, and in the application of these learnings to industry challenges. The course is a partnership between industry and academia. The high school provides a CTE instructor with a history in manufacturing to guide the “interns” through the course work and learnings. It is the objective of the teacher to help the interns bridge the gap between the school and work environments. The industry partner provides one or more “mentors” which engage directly with the students on projects. Ideally, the majority of the projects originate from the mentors.

**B. METHOD OF INSTRUCTION**

The format of the course instruction occurs as follows:

1. Instruction – introduction of subject matter, overview of application, and discussion linking subject matter to real life application.
2. Technical training – 50% of the course work is supported by on-line training used in industry. The interns must pass an on-line test demonstrating their understanding of the material prior to moving on to the course assignment.
3. Subject Assignment – Various projects are designed to encourage the interns to apply what they have learned in steps 1 and 2 above. As in the work environment, they work in small teams to accomplish the task or analysis and must learn to deal with team work and attendance dynamics much as they would in a work environment.
4. Interns communicate with Mentors on a daily basis following week 1.

**C. COURSE OBJECTIVES**

1. Instill work related soft skills including team work, stress management, work ethic (attendance), communication, and conflict resolution.
2. Provide technical training in skill sets required by industry.
3. Provide a hands-on learning environment to apply the skills and learnings to real life challenges. The challenges are assigned directly from industry whenever possible.

**D. COURSE TOPICS/UNITS AND DATES**

 **Week 1 and 2: Professionalism and Teamwork Training**

* + Interview Skills
	+ Resume construction
	+ Interview Practice
	+ Interview actual – with Mentors
	+ Tour of Mentor location – in this case Wafertech.
	+ 10 Laws of Collaboration
	+ Resume Development
	+ AES – Personal Qualities, Personal Management, Team work
	+ Amatrol – Communication, Working in Groups, Conflict Resolution

**Week 3: Technical Writing**

* + Instruction in Technical Writing
	+ Practice session – write instructions to make a PB&J sandwich.
	+ Assignment – Write process for dressing in a clean (“bunny”) suit.
	+ Have volunteers from outside the class follow the directions for both PB&J and “Bunny” suit exercise. Teams are judged by the resulting sandwich and success in following the written instructions.

**Week 4 - 6: Clean Room Concepts and Math**

* + Classroom Lecture on Clean Room math – measuring air quality and microns of contamination.
	+ Hand out of ISO certification and the meaning of clean room classifications
	+ Understanding of HEPA filters and how they operate
	+ Tour of Clean Room Environment – WSU
	+ Clean room project assignment – interns must evaluate cubic volume of air and air flow relative to the number of microns present. They must evaluate the impact of poor incoming air quality on manufacturing.

**Week 7: Working in Spreadsheets (Google Sheets)**

 **Tutorials:**

* + Lecture and demonstration – introduction to spreadsheets
	+ Modifying, cells, columns and rows
	+ Applying Formulas
	+ Understanding Cell References
	+ Working with functions
	+ Sorting and Filtering
	+ Google Sheets Quiz

**Week 8-10: Statistical Process Control**

* + Lecture Introduction to statistics – normal distributions, variation, control limits
	+ Amatrol Training – Understanding Variation, Probability, Control Charts
	+ Mini project – quality assurance of packaged beans. Interns sort and process beans to identify if the supply is in statistical control.
	+ SPC Project Assignment – based upon control charts, interns must identify if an issue exists, trouble shot the issue, test to insure the “fix” addressed the issue.
	+ Interns must identify the cost savings associate with correct SPC application.
	+ Interns formally present SPC work to mentors in person.

**Week 11-14: Lean Manufacturing Principles**

* + Lecture introduction to 6S: Sort, Straighten, Shine, Standardize, Sustain, Safety
	+ Trainings – Amatrol 6S
	+ Mini-project – application of 6S within the High School. Example: apply the principles to the custodial closet.
	+ Project – apply 6S to a larger environment. Example: The district warehouse. Ensure that the students identify savings in terms of hard dollars.
	+ Presentation of results presented to Mentors and school staff.

**Week 15: Supply Chain Management**

* + Lecture regarding supply chain dynamics inclusive of the Bull Whip effect.
	+ Simulation of supply chain application via the “Beer Game” – a simulation allowing interns to experience the typical coordination problems associated with supply chains. Students learn the importance of system level thinking.

**Week 16-18: Work Cell Project**

* + Interns are challenged by their mentors with specific work cell issues and asked to create improvement. Areas of focus include:
		1. Layout – how might the actual manufacturing environment be redesigned to increase efficiency?
		2. Loading – interns must optimize the throughput of the production facility given capacity constraints within the workcell.
		3. Staffing – interns are challenged to deal with the human factors inclusive of learning curves and attendance challenges.
	+ Each stage is reviewed with and approved with mentors prior to progressing to the next task.

**Week 19 – 20: Overview, Summary, and Reflection**

* + Interns prepare a course overview to be formally presented to their mentors on location (at the manufacturing site).

**E. REQUIRED TOOLS and Supplies**

1. Amatrol and AES training systems
2. Beer Game Simulation materials

**F. GRADING PLAN**

Evaluation of interns is based upon the following:

1. Attendance – 20%
2. Trainings – 20%
3. Team work and professionalism – 20%
4. Presentations – 10%
5. Projects – 30%

**G. COURSE COMPONENT SPECIFICS**

* + Interns are expected to be “at work” when they enter the classroom. It can be difficult to maintain this standard as interns will digress back into students without regular reminders that they are “at work” in the classroom.
	+ Grading is highly dependent upon teamwork. Struggles with this should be expected as they learn to communicate with and depend upon their fellow interns. Some interns will object to having their grade impacted by the performance of others. This is an appropriate learning to prepare them to transition from the school environment to the working environment.
	+ It is encouraged to screen incoming students for this course. They should be motivated and interested. Poor attendance and work ethic will weaken the program for all involved.
	+ Graduates from this program are attractive to companies looking for skilled labor in the manufacturing environment. These are relatively high paying jobs with benefits and potential for tuition support. Updating resumes for the learnings (6S, SPC, Google Sheets, etc) should be included as a part of the course.