RESEARCH EXPERIENCES FOR TEACHERS – SUMMER 2019

Enhancing Teacher Knowledge & Skills in Modern Manufacturing
6 Jun 2019

Project #1: Traditional Manufacturing – 13 teachers

1) Focus: 3-weeks on fundamentals of traditional manufacturing processes, materials, and metrology.

2) Lab training and integrated project: Select suitable materials and processes to improve performance of a Stirling engine. Some components will be fabricated during 4th-5th weeks using alternative processes.
   - Safety rules.
   - Technical drawing: Orthographic sketching. Sectioning. Dimensioning.
   - Metrology: Hand tools and systems for measurement of dimension, form, and surfaces.
   - Manual machining: Practice with manual machine tools.
   - Computer-aided machining: computer-aided drafting (CAD) and machining (CAM). Fusion 360 and NC code generation.

www.amazon.com/DjuiinoStar-Performance-Temperature-Stirling-Engine/

3) Authentic research experience**:** Participants will gain basic manufacturing skills and safety knowledge; understand the relationship between material and process.

4) Equipment:
   - Fabrication: Manual lathe, saw, drill, mill, CNC lathe, CNC mill, Fusion 360 software.
   - Metrology: Calipers, micrometer, indicator, height gage, go/no-go gage, measuring microscope, surface profilometer, optical profile projector, coordinate measuring machine.

5) Expected outcomes: At the end of this training, the participants should:
   - Be technically competent using basic metrology tools.
   - Experience with manual machine tools and typical operations.
   - Understand basic commands of Fusion360 software and CNC principles.
   - Understand and practice design process.
   - Have the first draft of curriculum integration

Date	Topic	By	Location
Mon 6/10		Wayne	
8-9am	Breakfast		
9-11am	Orientation: introduction, program overview and expectations, stipends, accommodation, parking, Rec center, library, lab safety, guest wifi, clicker, research, curriculum integration, test, pre-program survey…		
11-12pm	Lec 1: Design process	Wayne	122 Thom
12-1pm	Lunch break		
1-2pm	Group discussion	Shelly	
2-5pm	Lec 1: Design process. Project assignment (cont)	Wayne	
5-6pm	Campus tour	TBA	
Tue 6/11			
9-12 pm	Lec 1: Technical sketching	Mathew	122 Thom
12-1pm	Lunch break		
1-2pm	Group discussion	Shelly	
2-5pm	Lec 2: Metrology	Wayne	
Wed 6/12			
9-12pm.	Lec 1: Technical sketching (cont)	Mathew	122 Thom
12-1pm.	Lunch break		
1-2pm	Group discussion	Shelly	
2-5pm	Lec 2: Metrology	Wayne	
Thu 6/13		Mathew	
9-12pm	Lec 1: Technical sketching (cont)		122 Thom
12-1pm	Lunch break		
1-2pm	Group discussion	Shelly	
2-5pm	Lec 3: Engineering materials	Wayne	
Fri 6/14			
9-12pm	Lab 1: Metrology	Ken, Trenton	Lab @112A Thom
12-1pm	Lunch break		
2-5pm	Lab 2: Advanced metrology	Ken, Trenton	
Mon 6/17			
8-12pm	Lab 3: Stamping	Ken, Trenton	Lab @110 Thom
12-1pm	Lunch break		
1-2pm	Group discussion	Shelly	122 Thom
2-3pm	Curriculum writing --University Writing Center	Guest	
3-4pm	Lec 4: Stamping	Wayne	
Tue 6/18			
9-11am	Lec 6: Machining	Wayne	
11-12pm	Poster preparation --University Writing Center	Guest	122 Thom
12-1pm	Lunch break		
1-2pm	Group discussion	Shelly	
2-5pm	Lec 6: Machining (cont)	Wayne	
Wed 6/19			
8-12pm	Lab 4: Machining Introduction	Ken, Trenton	Lab @112 Thom
12-1pm	Lunch break		
1-2pm	Group discussion	Shelly	122 Thom
2-4pm	Lec 6: Machining (cont)	Wayne	
Thu 6/20			
9-12pm	Design project: Brainstorm, ideation	Wayne	
12-1pm	Lunch break		122 Thom
1-2pm	Group discussion	Shelly	
2-5pm	Design project: evaluate alternatives, select best design	Wayne	

Fri 6/21 8-12pm 12-1pm 2-4pm	 Lab 5 Milling Lunch break Lab 5 Milling	Ken, Trenton	Lab @112 Thom
Mon 6/24 9-12pm 12-1pm 1-2pm. 2-5pm	 Lec 7: Computer-aided manufacturing Lunch break Group discussion Lec 7: Computer-aided manufacturing (cont)	 Shyam Shelly Shyam	115B Thom
Tue 6/25 9-12pm 12-1pm 1-2 pm 2-5pm	 Lec 7: Computer-aided manufacturing (cont) Lunch break Group discussion Lec 7: Computer-aided manufacturing (cont)	 Shyam Shelly Shyam	115B Thom
Wed 6/26 9-12 pm 12-1pm 1-5pm	 Lab 6: CNC engraving Lunch break Lab 6: CNC engraving	 Shyam Shyam	115B Thom
Thu 6/27 9-12pm 21-1pm 1-2pm 2-5pm	 Design project. Sketch final design with details for fabrication. Lunch break Group discussion Curriculum integration, 1st draft	 Shyam	122 Thom
Fri 6/28 8-12pm 12-1pm 1-2pm 2-3pm	 Lab 7: Lathe turning Lunch break Curriculum plan presentation Mid-program Assessment	 Ken, Trenton Shelly Wayne	Lab @112 Thom 122 Thom