El Monte Union High School District

Course Outline

High School South El Monte

Title: Lean Manufacturing

Transitional*_____(Eng. Dept. Only)

Sheltered (SDAIE)*____Bilingual*___

AP**_____Honors**_____

Department: CTE (Ind. Tech)

Grade Level (s): 9-12

Semester_____Year_____

Year of State Framework Adoption_____

This course meets graduation requirements:

( ) English
( ) Fine Arts
( ) Foreign Language
( ) Health & Safety
( ) Math
( ) Physical Education
( ) Science
( ) Social Science
( ) Elective

Department/Cluster Approval	Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

*Instructional materials appropriate for English Language Learners are required.

**For AP/Honors course attach a page describing how this course is above and beyond a regular course. Also, explain why this course is the equivalent of a college level class.

1. Prerequisite(s): Passing Industrial Tech Core or Introduction to Engineering Design.

2. Short description of course which may also be used in the registration manual: This 180 hour course trains students to measure, design and produce parts using various manufacturing techniques using various machine tools including Computer controlled machines and 3D Printers. Students learn essential skills in design and manufacturing, including industry standard vocabulary, and basic manufacturing skills. Students develop skills through performance based projects in computer design, robotics, and production (CAD/CAM), computer numerical control (CNC), Rapid Prototyping (3D Printing), and engineering design through solid modeling.

3. Describe how this course integrates the schools ESLRs (Expected School-wide Learning Results):

Apply Academic Skills

Develop skills in measurement and math
Work with decimals to thousandths of inches.

- Work with decimals to thousandths of inches.
- Work with the imperial and metric systems of measurements
- Learn to read working drawings.
- Explain working drawings.
- Utilize third angle projection.
- Solve simple visualization problems.
- Learn to use section and detailed drawings.
- Learn to use the line alphabet.
- Solve simple visualization problems.
- Learn to use section and detailed drawings.
- Learn to use the line alphabet.
- Solve for the speed and feed of cutter when drilling.
- Identify threads and fasteners
- Understand the unified national thread system. UNTC
- Lear the differences between internal and external threads.
- Learn and explain thread fasteners.
- Explain non-thread fasteners.
- Understand the unified national thread system. UNTC
- Explain the difference between non-ferrous and ferrous metals.
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Utilize Technology as a Tool

- Maintenance of Equipment in the Work Environment
- Learn to use hand tools safely.
- Use power tools safely
- Identify threads and fasteners
- Safely handle cutting tools.
- Perform basic turning operations with an engine lathe.
- Perform basic milling operations with a vertical milling machine.
- Lear to read scales/Learn to read rules.
- Learn to read calipers, micrometers and high indicator.
- Learn to read other precision measurement tools like shims.
- Learn to use hand tools safely.
- Identify and use clamping.
- hacksaws, files, and reaming tools.
- Use power tools safely
- Leant to use portable power tools like grinders and drills.
- Identify threads and fasteners

Show Respect for Diversity

- Professionalism in Manufacturing
- Demonstrate skills in job planning.
- Value the ability to speak more than one language
- Show ethnic pride while respecting other cultures
- Promote his/her cultural values

Demonstrate Personal and Interpersonal Skills

Show up to work on time
Follow directions carefully
Learn to meet dead lines
Learn to work as part of a team/unit
Respect group and individual differences.

4. Describe the additional efforts/teaching techniques/methodology to be used to meet the needs of English Language Learners:

Operational Methodologies

- **Classroom (C) :** Instruction provided by a qualified teacher, utilizing a lesson plan, to a group of students in a classroom.
- **Community Classroom (CC):** An instructional method which utilizes unpaid, on-the-job training experiences at business, industry, and public agency sites.
- **Cooperative Vocational Education (CVE):** An instructional method which correlates concurrent, formal vocational classroom instruction with regularly scheduled, paid on-the-job training experience.
- **Related Instruction (RI):** Classroom instruction and unpaid/paid on-the-job training experiences are being conducted together within the same time frame (quarter, semester, etc.).
- **On-the-Job Training (OJT):** Refers to "hands-on" job skill training in either the community classroom (unpaid) or in correlation with cooperative vocational education (paid).

Training OJT Environment

Title 5 Education Code No. 10085
The following criteria shall be used to select and approve a community classroom training station:

- The management of the community classroom training station shall:
    - Have a clear understanding of the community classroom methodology and a willingness to participate in the training experience.
    - Cooperate with the career technical education director, or his/her designee, in preparing a written joint venture agreement.
    - Participate with the community classroom teacher in preparing an individualized training plan.
    - Provide and assist students with unpaid on-the-job training experiences as described in the individualized training plan.
    - Consult with the community classroom teacher regarding the student's progress during the unpaid on-the-job training experiences.
    - Assist in maintaining accurate records of the pupils training hours.
- The training station shall offer training opportunities in the specific occupation for which the course is approved. Training opportunities at the station shall expand competencies developed in the classroom instruction portion of the student's training.
- The training station shall have adequate equipment, materials, and other resources to provide an appropriate learning opportunity.
- Training station conditions shall prevail which will not endanger the health, safety, welfare, or morals of the pupil.
- The training station shall be concurrently engaged in a business operation, which requires employment in the occupation for which training is provided.

5. Describe the interdepartmental articulation process for this course:

This class will continuously communication communicate with other CTE classes. Will have ongoing recruitment process with PLTW and Math classes. This is a math based class and projects will involve team teaching and constant interdepartmental coopetation.

6. Describe how this course will integrate academic and vocational concepts, possibly through connecting activities. Describe how this course will address work-based learning/school to career concepts:

- Student portfolios
- Student demonstrations
- Individual and group presentations
- Supervisor/teacher observations
- Peer evaluations
- Self-reflections
- Critiques
- Rubrics
- Oral assessment
- Reports and research papers
- Projects
- Sketchbooks
- Tests and quizzes
- Performance tasks
- Key assignments:
  - Write a critique about an advertisement from a magazine.
  - Read and write definitions of elements of design.
  - Create a composition incorporating principles of design with geometric and organic shape containing color schemes.
  - Research a revolutionary designer and write a report.
  - Create a cultural event poster.
  - Create a strong conceptual advertisement that juxtaposes unexpectedness ideas.
  - Create an aesthetically pleasing brochure with concise, but informative content.
  - Redesign and already existing magazine to a new contemporary look.
  - Design a graphic based logo.
  - Design a bag, box, t-shirt, or other products that may be used in a company.

Students will be assessed in multiple ways to ensure that a variety of learning styles are addressed**.**

7. Materials of Instruction (Note: Materials of instruction for English Language Learners are required and should be listed below.)

- **Community Classroom (CC):** An instructional method which utilizes unpaid, on-the-job training experiences at business, industry, and public agency sites.
- **Cooperative Vocational Education (CVE):** An instructional method which correlates concurrent, formal vocational classroom instruction with regularly scheduled, paid on-the-job training experience.
- **Related Instruction (RI):** Classroom instruction and unpaid/paid on-the-job training experiences are being conducted together within the same time frame (quarter, semester, etc.).
- **On-the-Job Training (OJT):** Refers to "hands-on" job skill training in either the community classroom (unpaid) or in correlation with cooperative vocational education (paid).

A. Textbook(s) and Core Reading(s):

B. Supplemental Materials and Resources:

- Visual examples
- Teacher modeling
- Lecture and guided practice
- Demonstration
- Project-based learning
- Assigned readings from tutorials, textbooks, journals, etc.
- Class discussions
- Hands-on lab activities
- Multimedia presentations
- Individual instruction
- Cooperative learning
- Field trips
- Work-based learning experiences
- Guest speakers
- Web-based research
- Videos
- Student presentations (oral, written, technological)
- Utilization of computers/technology

C. Tools, Equipment, Technology, Manipulatives, Audio-Visual:

8.

- **Objectives of Course**

The following are some of the course objective but are not limited to:

- Professionalism in Manufacturing
- Handling of Materials
- Handling of Shop Supplies
- Maintenance of Equipment in the Work Environment
- Develop skills in measurement and math.
- Learn to use hand tools safely.
- Use power tools safely
- Identify threads and fasteners
- Safely handle cutting tools.
- Perform basic turning operations with an engine lathe.
- Perform basic milling operations with a vertical milling machine.

- **Unit detail including projects and activities including duration of units (pacing plan), the following are expressed in weeks 1 – 36 for the entire year.**

- 1. Demonstrate skills in job planning.
- 1. Professionalism in Manufacturing

- 2.Handling of Materials
- 2.Handling of Shop Supplies
- 3.Maintenance of Equipment in the Work Environment
- 3. Develop skills in measurement and math.
- 3. Work with decimals to thousandths of inches.
- 3.Work with the imperial and metric systems of measurements
- 4. Learn to read scales/Learn to read rules.
- 4. Learn to read calipers, micrometers and high indicator.
- 4. Learn to read other precision measurement tools like shims.
- 5. Learn to read working drawings.
- 6. Explain working drawings.
- 6. Utilize third angle projection.
- 7. Solve simple visualization problems.
- 7. Learn to use section and detailed drawings.
- 8. Learn to use the line alphabet.
- **BASIC METALWORKING SKILLS**
- 9. Develop a safe working attitude in the production plant.
- 9. Identify and classify metals.
- 10. Explain the difference between non-ferrous and ferrous metals.
- 10. Handle materials with care and precaution.
- 10. Learn to measure different types of standard materials.
- 11. Learn to Explain heat treating, including measuring for hardness.
- 11. Demonstrate layout methods and tools.
- 12. Prepare metal for layout.
- 13. Identify layout tools.
- 13. Prepare a layout.
- 14. Demonstrate and understand safety precautions for layout work.
- 14. Learn to use hand tools safely.
- 15. Identify and use clamping.
- 15. Hacksaws, files, and reaming tools.
- 16. Use power tools safely
- 16. Learn to use portable power tools like grinders and drills.
- 17. Identify threads and fasteners
- 18. Understand the unified national thread system. UNTC
- 18. Learn the differences between internal and external threads.
- 18. Learn and explain thread fasteners.
- 18. Explain non-thread fasteners.
- 19. Utilize adhesives utilized in the field.
- 19. Handle fasteners and adhesives safely.
- 19. Safely handle cutting tools.
- 19. Select the correct cutter for drilling operations.
- 19. Select the proper cutter for drill operation.
- 20. Solve for the speed and feed of cutter when drilling.
- 20. Utilize reference books for recommended surface speed charts.
- 20. Use tap and drills for specific threads.
- 20. Understand other drilling operations, including counter boring and countersinking.
- 21. Understand safety for drilling operations.
- 21. Perform basic turning operations with an engine lathe.
- 21. Describe basic lathe operations.
- 22. Identify the parts and functions of a manual lathe.
- 22. Describe and select work holding methods for the job and for safety.

- 22. Identify and choose the right cutting tool for the operations.
- 22. Understand basic setups on the lathe.
- 23. Demonstrate safety procedures for the turning operation on a lathe.
- 23. Perform basic milling operations with a vertical milling machine.
- 24. Describe basic milling operations.
- 24. Identify the parts and functions of a vertical milling machine.
- 24. Describe and select work-holding methods for the job and safety.
- 25. Identify and choose the right cutting tool for the operation of the milling machine.
- 25. Understand basic setup on the milling machine.
- 26. Demonstrate safety procedures for the turning operation on a milling machine.
- 26. Demonstrate skills in job planning.
- 26. Write a project plan identifying which machine types to use.
- 27. Identify operations to be performed on a project.
- 27. Find and correct operation sequences that are unsafe.
- 27. Demonstrate basic skills in welding.
- 28. Identify types of welding equipment.
- 28. Describe equipment care procedures and troubleshooting.
- 28. Identify various power supplies.
- 28. Explain operation of various power supplies.
- 28. Demonstrate safe use of various types of power supplies.
- 28. Understand alternating current/direct current.
- 29. Demonstrate understanding of rules and regulations, such as returning tools to their proper place.
- 30. Demonstrate skills in gas metal arc welding.
- 31. Distinguish various uses of gas metal arc welding (GMAW) equipment.
- 31-33. Demonstrate proper use of GMAW welding equipment.
- 34-36. Demonstrate basic weld joints.

Indicate references to state framework(s)/standards (If state standard is not applicable then national standard should be used)

- **Student performance standards**
- Discuss health and safety policies, procedures, regulations, practices and exhibit the proper use of equipment and handling of hazardous materials*. AS 6.0*
- Apply appropriate technical skills and academic knowledge. *CRP 1*
- Communicate clearly, effectively, and with reason. *CRP 2*
- Explain how a positive attitude can help in becoming an effective communicator.
- Practice good communication to help build positive relationships in the classroom and at the workplace.
- Compare and contrast written and oral communications.
- Describe the importance of email etiquette as it relates to effective communication.
- Develop an education and career plan aligned with personal goals. *CRP 3*
- Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. *AS 3.0*
- Apply the decision-making process to develop a college and career plan. *AS 5.0*
- Apply technology to enhance productivity. *CRP 4*
- Use technology, including the Internet, to produce, publish, and update individual or shared

writing products in response to ongoing feedback, including new arguments and information. *AS 4.0; AS 10.0*

- Practice personal health and understand financial literacy. *CRP 6*
- Identify factors related to a person's well-being.
- Act as a responsible citizen in the workplace and the community. *CRP 7*
- Work productively in teams while integrating cultural and global competence. *CRP 9*
- Use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies. AS 6.1
- Interpret policies, procedures, and regulations for the workplace environment, including employer and employee responsibilities. AS 6.2
- Use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies. AS 6.3

Evaluation/assessment/rubrics

Assessment of Student Performance

Assessment of student performance may include but is not limited to:

- Student portfolios
- Student demonstrations
- Individual and group presentations
- Supervisor/teacher observations
- Peer evaluations
- Self-reflections
- Critiques
- Rubrics
- Oral assessment
- Reports and research papers
- Projects
- Sketchbooks
- Tests and quizzes
- Performance tasks

Key assignments

- **Include minimal attainment for student to pass course**

****** A grade of C or better is required to move on to On the Job training segment of the class and to qualify for industry certification.