

PALOMAR COLLEGE
COURSE OUTLINE OF RECORD FOR
DEGREE CREDIT COURSE

X Transfer Course X A.A. Degree Applicable Course
(check all that apply)

COURSE NUMBER AND TITLE:

ECHT 161 Surface Mount Technology: General Skills and Concepts

UNIT VALUE: 1 MINIMUM NUMBER OF SEMESTER HOURS: 16

BASIC SKILLS REQUIREMENTS: Appropriate language and computational skills.

ENTRANCE REQUIREMENTS:

PREREQUISITE: None.

COREQUISITE: None.

RECOMMENDED PREPARATION: None.

SCOPE OF COURSE:

An introduction to surface mount concepts: language, types of mounting, components, packaging, processes, equipment, design, and standards.

SPECIFIC COURSE OBJECTIVES:

The student will:

1. Utilize the language of surface mount technology.
2. Identify surface mount components and packages.
3. Explain surface mount processes and equipment.
4. Categorize workmanship standards.
5. Compare design standards for printed circuits boards.

CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

I. Introduction

The Language of Surface Mount Technology

1. A description of the acronyms used in the industry and what they mean.
2. Handouts, slide shows, physical examples, etc.
3. A history of surface mount technology. Why it caught on, touching on the military and NASA involvement, and the advantages of surface mount technology.
4. Environmental issues including the manufacturing facility and effects on the Earth.
5. Resources - where to get reference material.

II. Components and Packages

An introduction to the basic packages used in surface mount technology.

1. Explanation of the differences between other types of component packages and surface mount types.
2. Physical examples of surface mount components and circuit boards.

III. Process and Equipment Overview

- A. A description of the general manufacturing flow.
- B. A discussion of the types of equipment used for the manufacturing of equipment used for the manufacturing of surface mount assemblies including the following.
 1. Solder Stencil / Printers
 2. Liquid Dispensing Systems
 3. Pick and Place Machines
 4. Reflow Systems
 5. Cleaning Systems
 6. Testing Systems
 7. Hand Assembly and Rework Systems
- C. A discussion of the types of designs including:
 1. Mixed Technology.
 2. Single Sided Surface Mount Board Designs
 3. Double Sided Surface Mount Board Designs
- D. A field trip to a surface mount manufacturing facility.

IV. Workmanship Standard

- A. A discussion and explanation of the many standards in the industry.
 1. Military
 2. Commercial
 3. Company Specific
- B. A discussion of the differences between military and commercial standards and why they exist.
- C. Design and quality standards and their impact and effect on the final surface mount assembly.

- V. Design considerations of printed circuit boards designed for surface mount assemblies including the following.
- A. A discussion on design standards.
 - B. Tooling pads and points.
 - C. Land standards.
 - D. The importance of Fiducials.
 - E. Height restrictions.
 - F. Placement restrictions.
 - G. An explanation of the criteria of printed circuit board design and why pads are designed the way they are.

REQUIRED READING:

Maslowski, Allen. Surface Mount Technology General Skills and Concepts Seminar.
Carlsbad, CA: Turbatek Enterprises, 1994.

SUGGESTED READING:

Current manufacturing published information. Provided by instructor.

REQUIRED WRITING:

1. Essays (design/analysis explanations requiring critical thinking) are required in evaluation testing of approximately one to three paragraphs in length.
2. Problem solving exercises used in evaluation testing of approximately one to three paragraphs in length.

OUTSIDE ASSIGNMENTS:

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short-term classes.

Reading assignments are from handouts and a twenty-nine page course manual.

INSTRUCTIONAL METHODOLOGY:

Check all that apply:

- lecture
- laboratory
- lecture-laboratory combination
- directed study

This course may be offered as a distance education course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380.

Yes No

If yes, check all that apply. (See guidelines for preparation for definitions.)

- telecourse
- mediated instruction
- computer assisted instruction

GRADING POLICY AND STANDARDS (include methods for determining whether the stated objectives have been met by students):

Student performances will typically be categorized and weighted as follows:

Class participation:	20%	A=90 - 100%
Quizzes:	50%	B =80 - 89%
Final Test:	30%	C =70 - 79%
		D =60 - 69%
		F =00 - 59%

IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?

Yes No.

Number of times course may be taken for credit: 1.

If yes, identify specific provision of Title 5 Division 2 section(s) 55761-55763 and 58161 which qualifies course as repeatable:

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