Modesto Junior College
Proposed Course Outline

MFGA 367

I. OVERVIEW
The following information will appear in the 2011 - 2012 catalog

MFGA 367  Plumbing Principles and Methods   2 Units
Also offered as: INTEC - 367: Plumbing Principles and Methods
Formerly listed as: INTEC - 367: Plumbing Principles and Methods

Principles of design, installation, maintenance and troubleshooting of residential and commercial pipe fitting and plumbing. Discussions and activities involve application of standard plumbing practices.

Field trips might be required. (A-F Only) Lecture /Lab

II. LEARNING CONTEXT
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT

1. Required Content:

   a. Sewage Disposal Systems
      i. Municipal
      ii. Private

   b. Materials used for Sewer Pipe and Fittings

   c. Drainage System Pipe Joints

   d. The House Sewer

   e. Soil, Waste, Trap, and Vent Pipe Principles

   f. Water Supplies
      i. Purification-Aeration
      ii. Softening Systems
      iii. Reverse Osmosis Systems
      iv. Magnesium Removal

   g. Materials used for Water Distribution

   h. The Building Water Supply
      i. Sizing the Water Service
      ii. Installation Procedure
i. Cold Water Distribution System
j. Domestic Hot-Water Supply
k. Hot-Water Distribution System
l. Private Water Connection
m. Cross-Connections
n. Plumbing Fixtures
o. Wells

2. **Required Lab Content:**

Laboratory time for this course is dedicated to providing students with instructor led demonstrations of tools, materials and sample industry standard designs. Student time in lab focuses on the following content:

a. Design basic pipe fitting plans for installation
b. Calculating pipe fitting loads
c. Troubleshooting pipe fitting situations (Case Studies)

**B. HOURS AND UNITS**

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<thead>
<tr>
<th>INST METHOD</th>
<th>TERM HOURS</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Lect</td>
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<td>1.00</td>
</tr>
<tr>
<td>Lab</td>
<td>54</td>
<td>1.00</td>
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**C. METHODS OF INSTRUCTION (TYPICAL)**

Instructors of the course might conduct the course using the following method:

1. Classroom Lecture
2. Group Discussion
3. Guest Speakers
4. Multimedia: PowerPoint, Internet, videos, text, CDs
5. Laboratory Demonstrations
6. Individualized or group lab assignment feedback

**D. ASSIGNMENTS (TYPICAL)**

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**
   
   Time spent on coursework in addition to hours of instruction (lecture hours)

a. Weekly Chapter Reading Assignments
b. Per Term Laboratory Assignments
2. **EVIDENCE OF CRITICAL THINKING**  
*Assignments require the appropriate level of critical thinking*

**Question 4:**
Using the following information calculate the required thrust block area against undisturbed soil.

- **Pipe Diameter** = 8"  
- **Water pressure** = 125 psi  
- **Fitting** = 45-Degree Bend  
- **Bearing strength of soil** = 1500 lb/ft²  
- **Safety Factor** = 1.5

Note that in this question the water pressure is 125 psi. The table in NFPA 24 gives values when the pressure is equal to 100 psi. If the pressure is above or below 100 psi you have to adjust for this with a ratio of the actual pressure divided by 100 such as n/100 where n=the actual pressure. Footnote #2 of the table shows how this works.

**Question 5: FIRE PUMPS AND Pressures**
You are installing an underground fire main between a remotely located private fire pump and the building’s sprinkler riser. The civil plans require that you provide a pipe with a pressure rating for the normally anticipated pressure on the system once the sprinkler contractor sizes the pump. The sprinkler contractor will not be installing any pressure control devices.

The normal static city supply pressure to the pump is 40 psi.

The sprinkler contractor is providing a pump rated at 75 psi at 1,000 gpm. The fire pump will deliver a normal churn pressure (pressure when water is not flowing) of 120%.

What pressure rating of pipe is required between the pump and the building riser?

- 150 psi  
- 175 psi  
- 200 psi

**Question 6: FRICTION LOSS**
A sprinkler system has a hydraulically calculated demand of 250 gpm at 50 psi at the riser. The available flow at the street is 250 gpm at 60 psi. The equivalent length of run (including fittings, valves, etc.) from the street to the riser is 200 ft.

Using the information below, what is the minimum size supply pipe needed to supply this system? Assume that any safety factors have already been included in the riser demand.

Friction loss: 3" = 0.0426 psi/ft and 4" = 0.0107 psi/ft

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### E. TEXTS AND OTHER READINGS (TYPICAL)


3. Other: Eye protection is required for all laboratory activities.
4. Other: Coveralls or aprons are option during laboratory activities

III. DESIRED LEARNING

A. COURSE GOAL
As a result of satisfactory completion of this course, the student should be prepared to:

- apply scientific principles governing the design and analysis of piping systems and summarize and report on the appropriate safety requirements for the installation of a residential plumbing application.

B. STUDENT LEARNING GOALS
Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. **Required Learning Goals**
   Upon satisfactory completion of this course, the student will be able to:
   a. Properly identify and explain the uses of tools and materials used in the pipe fitting and plumbing trades
   b. Interpret basic codes and ordinances affecting installation of plumbing
   c. Analyze scientific principles governing the design of piping systems
   d. Summarize safety requirements for the installation of residential and commercial plumbing
   e. Calculate and explain piping load requirements and their influence in designing systems
   f. Plan, design, build, install and troubleshoot an efficient piping system
   g. Correlate codes and ordinances to practical environmental situations

2. **Lab Learning Goals**
   Upon satisfactory completion of the lab portion of this course, the student will be able to:
   a. Design basic pipe fitting plans for installation
   b. Plan, design, build, install and troubleshoot an efficient piping system
   c. Calculate piping load requirements
   d. Properly identify and use tools and materials used in the pipe fitting and plumbing trades

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT
   1. Quizzes
   2. Homework and Classroom Exercises
   3. Laboratory Exercises

B. SUMMATIVE ASSESSMENT
   1. Classroom presentations
2. Participation in group activities
3. Mid Term Exam
4. Final Exam