

Steamfitting

**STEAMFITTING – STMFT**

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 Mathematics and Engineering Division  
 Mathematics Building, Room 267

**Possible career opportunities**

In collaboration with Plumbers and Steamfitters Union Local 159 email: [info@plumbers159.org](mailto:info@plumbers159.org) and Plumbers-Steamfitters-Refrigeration Union Local 342 [www.ua342.org](http://www.ua342.org), DVC offers two five-year apprenticeship programs: steamfitting and plumbing. Apprenticeship is training that is designed to prepare an individual for a career in the skilled crafts and trades. Apprentices develop technical skills, experience the sharing of assignments and see how technical tasks relate specifically with theoretical knowledge and interpretation. Apprentices earn a wage while learning. Enrollment in this program is restricted. You must be registered as an apprentice with the State of California to participate in the program and accepted into the apprenticeship program by our Union partners.

Plumbers-Steamfitters-Refrigeration Union Local 342,  
 Joint Apprenticeship and Journeymen Training Office

935 Detroit Avenue  
 Concord, CA 94518-2501  
 925-686-0730

Plumbers and Steamfitters Local 159  
 1308 Roman Way  
 Martinez, CA 94553  
 800-443-0220 or  
 925-229-0883  
 email: [info@plumbers159.org](mailto:info@plumbers159.org)

**Associate in science degree  
 Steamfitting**

Students completing the program will be able to...

- A. discuss safety harness practices during rigging.
- B. apply mathematical formulas for calculating travel on a spool.
- C. demonstrate knowledge of using a band saw.
- D. use proper method in fabricating a copper spool.
- E. explain the responsibilities of a journey person with regards to training an apprentice on the job.
- F. demonstrate use of tubing benders.
- G. explain the attributes of a successful apprentice

This program is offered in collaboration with Plumbers and Steamfitters Union Local 159 and Plumbers-Steamfitters-Refrigeration (HVACR) Union Local 342. Apprenticeship is training that is designed to prepare an individual for a career in the skilled crafts and trades. Apprentices develop technical skills, experience the sharing of assignments and see how technical tasks relate specifically with theoretical knowledge and interpretation. Apprentices earn a wage while learning. Enrollment in this program is restricted. You must be registered as an apprentice with the State of California to participate in the program and accepted into the apprenticeship program by our union partners.

This program prepares students to become steamfitters and includes an introduction to the installation, maintenance, and repair of different types of pipe systems; tool use; material applications and storage; and safety. Upon completion of the program, students will be able to install pipe systems that move liquids or gases under high pressure and use many different materials and construction techniques, depending on the type of project. They will be able to follow building plans or blueprints and instructions from supervisors to lay out the job and work efficiently with the materials and tools of the trade.

To earn an associate in science degree with a major in steamfitting, students must complete 20 out of 31 core courses to meet their individual educational and career goals. In addition they must complete General Education Option 1 (DVC General Education). Students must complete each course used to meet a major requirement with a "C" grade or higher and maintain an overall GPA of 2.5 or higher in the coursework required for the major. The associate in science degree with a major in steamfitting is not a transfer program.

DVC steamfitting students who intend to transfer must consult with a program advisor or counselor to ensure that the requirements for transfer to baccalaureate institutions of their choice are met.

*major requirements:*

<i>complete at least 30 units from:</i>	<i>units</i>
STMFT-110 OSHA-CPR.....	1.5-2.5
STMFT-111 Trade Mathematics.....	1.5-2.5
STMFT-112 Use and Care of Tools.....	1.5-2.5
STMFT-113 Welding Safety/Plate Welding.....	1.5-2.5
STMFT-114 Oxygen/Acetylene Cutting.....	1.5-2.5
STMFT-115 Pipe Shop I.....	1.5-2.5
STMFT-116 Pipe Shop II.....	1.5-2.5
STMFT-117 Related Science in the Piping Trades.....	1.5-2.5
STMFT-118 Beginning Drawing and Plan Reading for the Piping Trades.....	1.5-2.5
STMFT-119 Advanced Drawing in the Piping Trade.....	1.5-2.5
STMFT-120 Instrumentation I.....	1.5-2.5
STMFT-121 Instrumentation II.....	1.5-2.5
STMFT-122 Steam Systems.....	1.5-2.5
STMFT-123 Electricity for Steamfitting.....	1.5-2.5
STMFT-124 Industrial Rigging.....	1.5-2.5
STMFT-125 Beginning AutoCAD.....	1.5-2.5
STMFT-126 Advanced AutoCAD.....	1.5-2.5
STMFT-127 Pumps.....	1.5-2.5
STMFT-128 Tube Bending.....	1.5-2.5
STMFT-129 Union Heritage.....	3
STMFT-131 Pipe Welding 1.....	1.5-2.5
STMFT-132 Welding 5.....	1.5-3.5
STMFT-133 Welding 6.....	1.5-3.5
STMFT-134 Welding 7.....	1.5-3.5
STMFT-135 Welding 8.....	1.5-3.5
STMFT-136 Welding 9.....	1.5-3.5
STMFT-137 Welding 10.....	1.5-3.5
STMFT-138 Orbital Welding.....	1.5-3.5
STMFT-140 Construction Management in Steamfitting.....	1.5-2.5

**total minimum units for the major 30**

Steamfitting

**Certificate of achievement  
Steamfitting**

Students completing the program will be able to...

- A. demonstrate proper isometric drawing technique.
- B. apply mathematical formula for calculating load weight on pipe.
- C. use the proper method to cut a steel plate, using an OXY/ACT torch.
- D. explain proper brazing technique for copper.
- E. demonstrate proper knot tying.
- F. demonstrate proper preparation for a beveled coupon.
- G. explain the attributes of a successful apprentice.

This program is offered in collaboration with Plumbers and Steamfitters Union Local 159 and Plumbers-Steamfitters-Refrigeration (HVACR) Union Local 342. Apprenticeship is training that is designed to prepare an individual for a career in the skilled crafts and trades. Apprentices develop technical skills, experience the sharing of assignments and see how technical tasks relate specifically with theoretical knowledge and interpretation. Apprentices earn a wage while learning. Enrollment in this program is restricted. You must be registered as an apprentice with the State of California to participate in the program and accepted into the apprenticeship program by our union partners.

This program prepares students to become steamfitters and includes an introduction to the installation, maintenance, and repair of different types of pipe systems; tool use; material applications and storage; and safety. Upon completion of the program, students will be able to install pipe systems that move liquids or gases under high pressure and use many different materials and construction techniques, depending on the type of project. They will be able to follow building plans or blueprints and instructions from supervisors to lay out the job and work efficiently with the materials and tools of the trade.

To earn a certificate of achievement, students must complete 14 out of 19 core courses. Students must complete each course used to meet a major requirement with a "C" grade or higher and maintain an overall GPA of 2.5 or higher in the coursework required for the certificate. The courses required for the certificate of achievement also meet some of the requirements of the major for the associate of science degree.

<i>complete at least of 21 units from:</i>	<i>units</i>
STMFT-110 OSHA-CPR.....	1.5-2.5
STMFT-111 Trade Mathematics.....	1.5-2.5
STMFT-112 Use and Care of Tools.....	1.5-2.5
STMFT-113 Welding Safety/Plate Welding.....	1.5-2.5
STMFT-114 Oxygen/Acetylene Cutting.....	1.5-2.5
STMFT-115 Pipe Shop I.....	1.5-2.5
STMFT-116 Pipe Shop II.....	1.5-2.5
STMFT-117 Related Science in the Piping Trades.....	1.5-2.5
STMFT-118 Beginning Drawing and Plan Reading for the Piping Trades.....	1.5-2.5
STMFT-119 Advanced Drawing in the Piping Trade.....	1.5-2.5
STMFT-120 Instrumentation I.....	1.5-2.5
STMFT-121 Instrumentation II.....	1.5-2.5
STMFT-122 Steam Systems.....	1.5-2.5
STMFT-123 Electricity for Steamfitting.....	1.5-2.5
STMFT-124 Industrial Rigging.....	1.5-2.5

STMFT-125 Beginning AutoCAD.....	1.5-2.5
STMFT-126 Advanced AutoCAD.....	1.5-2.5
STMFT-127 Pumps.....	1.5-2.5
STMFT-128 Tube Bending.....	1.5-2.5
STMFT-129 Union Heritage.....	3

**total minimum required units 21**

**Certificate of accomplishment  
Steamfitting**

Students completing the program will be able to...

- A. explain the responsibilities of a journey person with regards to training an apprentice on the job.
- B. apply mathematical formula for calculating load weight on pipe.
- C. demonstrate proper knot tying.
- D. use the proper method to cut a steel plate, using an OXY/ACT torch.

This program is offered in collaboration with Plumbers and Steamfitters Union Local 159 and Plumbers-Steamfitters-Refrigeration (HVACR) Union Local 342. Apprenticeship is training that is designed to prepare an individual for a career in the skilled crafts and trades. Apprentices develop technical skills, experience the sharing of assignments and see how technical tasks relate specifically with theoretical knowledge and interpretation. Apprentices earn a wage while learning. Enrollment in this program is restricted. You must be registered as an apprentice with the State of California to participate in the program and accepted into the apprenticeship program by our union partners.

Program content includes an introduction to the installation, maintenance, and repair of different types of pipe systems; tool use; material applications and storage; and safety. Upon completion of the program, students will be able to install pipe systems that move liquids or gases under high pressure and use many different materials and construction techniques, depending on the type of project. They will be able to follow building plans or blueprints and instructions from supervisors to lay out the job and work efficiently with the materials and tools of the trade.

To earn a certificate of accomplishment students must complete five out of seven core courses. Students must complete each course used to meet a major requirement with a "C" grade or higher and maintain an overall GPA of 2.5 or higher in the coursework required for the certificate. The courses required for the certificate of accomplishment also meet some of the requirements of the certificate of achievement and major for the associate of science degree.

<i>complete at least 10 units from:</i>	<i>units</i>
STMFT-110 OSHA-CPR.....	1.5-2.5
STMFT-111 Trade Mathematics.....	1.5-2.5
STMFT-112 Use and Care of Tools.....	1.5-2.5
STMFT-113 Welding Safety/Plate Welding.....	1.5-2.5
STMFT-114 Oxygen/Acetylene Cutting.....	1.5-2.5
STMFT-115 Pipe Shop I.....	1.5-2.5
STMFT-116 Pipe Shop II.....	1.5-2.5

**total minimum required units 10.5**

## Steamfitting

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### **STMFT-110 OSHA-CPR**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the union local responsible for the section. This class is the same as PLUMB-110.*

This course covers the regulations governed by OSHA 30 that provide and recognize safe work practices. The student will receive certification in Cardio-Pulmonary Resuscitation and First Aid.

### **STMFT-111 Trade Mathematics**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the union local responsible for the section. This class is the same as PLUMB-111.*

This course covers the approaches to mathematical problem solving used in pipe fitting and plumbing.

### **STMFT-112 Use and Care of Tools**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the union local responsible for the section.*

This course presents an introduction to the identification of tools encountered in the industrial environment and the proper use of trade-related tools.

### **STMFT-113 Welding Safety/Plate Welding**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.*

This course presents an introduction to welding safety and theory. Students will also be introduced to plate arc welding.

### **STMFT-114 Oxygen/Acetylene Cutting**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.*

This course presents an introduction to oxygen and acetylene cutting and safety. The processes to cut various plate/pipe thicknesses and layouts will also be discussed and practiced.

### **STMFT-115 Pipe Shop I**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.*

This course gives related technical instruction to enhance the apprentice's on-the-job training in pipefitting and related technology. The use of various pipe and fitting materials and their applications to piping projects as described in technical drawings will be covered.

### **STMFT-116 Pipe Shop II**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.*

This course gives related technical instruction to enhance the apprentice's on-the-job training in pipefitting and related technology. Students will be introduced to basic isometric drawing and steam systems with copper connections to be made with soldering, brazing, and welding procedures.

### **STMFT-117 Related Science in the Piping Trades**

1.5-2.5 units LR

- Variable hours
- *Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section. This class is the same as PLUMB-117.*

This course covers the scientific and mechanical principles that are basic to the work of the piping industry. An overview of hydraulic and pneumatic systems as well as industrial plumbing and piping systems and materials will be covered.

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### STMFT-118 Beginning Drawing and Plan Reading for the Piping Trades

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section. This class is the same as PLUMB-118.

This course covers the interpretation of drawings and sketches associated with piping installation. An introduction to basic drawing and drafting methods, technical symbols, and notation will be covered in orthographic and isometric drawing views.

### STMFT-119 Advanced Drawing in the Piping Trades

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section. This class is the same as PLUMB-119.

In this course students will Interpret, coordinate and make drawings and sketches associated with piping installation.

### STMFT-120 Instrumentation I

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course gives related technical instruction to enhance the apprentice's on-the-job training in pipefitting and related technology. Students will be introduced to instrumentation, which includes basic descriptions of processes, loop diagrams and documentation in the instrumentation field.

### STMFT-121 Instrumentation II

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course gives related technical instruction to enhance the apprentice's on-the-job training in pipefitting and related technology. Students will be introduced to more advanced Instrumentation including pneumatic controls, liquid level instruments, analyzers, and fiber optic signals.

### STMFT-122 Steam Systems

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course gives related technical instruction to enhance the apprentice's on-the-job training in pipefitting and related technology. Students will be introduced to the properties of saturated steam, traps, boilers, and heating systems.

### STMFT-123 Electricity for Steamfitting

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This is an introductory course in electrical concepts, components, systems, and equipment. Ohm's and Kirchoff's laws are used to calculate and measure resistance, voltage, amperage, power in circuits, and safety in the field of steamfitting.

### STMFT-124 Industrial Rigging

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course presents the study of rigging for the pipe trades and emphasizes principles of safety. Topics will include safety, load limits, crane ratings, basic knots, and organizing a rigging plan.

### STMFT-125 Beginning AutoCAD

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This introductory course presents the fundamentals of AutoCAD and its application to the creation of technical drawings. Hands-on training is utilized to provide a comprehensive overview of the software package and its applications to technical drafting.

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### STMFT-126 Advanced AutoCAD

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course is designed for students with previous knowledge and experience in using AutoCAD. Three-dimensional modeling, solid models, customization, and optimal application of AutoCAD are presented.

### STMFT-127 Pumps

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course presents the practical and theoretical aspects of pump systems. Topics include concepts and theory as well as common systems, components, devices, installation, and operation. The laboratory emphasizes hands-on exercises in the installation, operation, and maintenance of industrial pumps.

### STMFT-128 Tube Bending

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course presents the practical and theoretical aspects of tube bending. Topics include theory and concepts of tube bending, as well as components, tools, and installation. The laboratory emphasizes hands-on exercises in the mechanical skills of industrial tube bending including calculating angles, different types of tubing, valves, fittings, clamps and installation.

### STMFT-129 Union Heritage

3 units LR

- 54 hours lecture per term
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course presents the heritage and traditions of the United Association, which represents plumbers, steamfitters, and welders among other occupations. Topics include partnerships between the United Association and local union contractors, good work practices, and history of the pipe trades.

### STMFT-131 Pipe Welding 1

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course covers the practical and theoretical aspects of welding processes for the steamfitting apprentice. Safe procedures, components, regulator settings and practices for use of the cutting torch, and groove pipe welding are presented.

### STMFT-132 Welding 5

1.5-3.5 units LR

- Variable hours
- Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course is an introduction to the techniques and methods for welding processes for the steamfitting apprentice. Students will learn how to identify various welding rods, electrodes, and their applications.

### STMFT-133 Welding 6

1.5-3.5 units LR

- Variable hours
- Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course is an introduction to the techniques and methods for welding processes for the steamfitting apprentice. Techniques studied will include string beads on an open grooved pipe weld.

### STMFT-134 Welding 7

1.5-3.5 units LR

- Variable hours
- Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course is an introduction to the techniques and methods for welding processes for the steamfitting apprentice. The topics will include proper handling of grinders, weld coupons, identification of hazards, and an introduction to bevel groove welding processes on pipe.

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### STMFT-135 Welding 8

1.5-3.5 units LR

- Variable hours
- Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course is an introduction to the techniques and methods for welding processes for the steamfitting apprentice. Techniques studied will include gas tungsten arc welding (GTAW) process.

### STMFT-136 Welding 9

1.5-3.5 units LR

- Variable hours
- Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course introduces the techniques and methods for welding processes for steamfitting apprentices. Topics include gas metal arc welding (GMAW) and metal arc welding equipment, processes, and applications.

### STMFT-137 Welding 10

1.5-3.5 units LR

- Variable hours
- Note: This program is sponsored by the United Association of Union Plumbers, Fitters, Welders, and Service Technicians and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course is an introduction to the techniques and methods for welding processes for the steamfitting apprentice. The topics will include identification of materials, dissimilar metal, distortion control, welding symbols for materials, fabrication standards, and codes.

### STMFT-138 Orbital Welding

1.5-3.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course covers the practical and theoretical aspects of automatic orbital welding machine processes for the steamfitting apprentice. Topics include safety procedures, components, settings, calibration, and practice using the orbital welding machine.

### STMFT-140 Construction Management in Steamfitting

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

This course offers an introduction to construction management in steamfitting. Topics include administrative procedures, plans and specifications, scheduling, permits, variances, and forms of communication.

### STMFT-141 Hydrostatic Testing

1.5-2.5 units LR

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local Union responsible for this section.

This course presents the proper procedures to successfully complete a hydrostatic test on a piping system. Demonstrations of test packages, hydrostatic pump test procedures, pressure and safely securing the testing area will be included.

### STMFT-150 Topics in Steamfitting

.3-4 units SC

- Variable hours
- Note: This program is sponsored by the International Brotherhood of Steamfitters and Plumbers and is for apprenticeship only. Course enrollment is limited to those who have been accepted by the local union responsible for the section.

A supplemental course in steamfitting to provide a study of current concepts and problems in steamfitting and related subdivisions. Specific topics will be announced in the schedule of classes.

### STMFT-299 Student Instructional Assistant

.5-3 units SC

- Variable hours
- Note: Applications must be approved through the Instruction Office. Students must be supervised by a DVC instructor.

Students work as instructional assistants, lab assistants and research assistants in this department. The instructional assistants function as group discussion leaders, meet and assist students with problems and projects, or help instructors by setting up laboratory or demonstration apparatus. Students may not assist in course sections in which they are currently enrolled.