## Signature Page

### I. Team Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Member Type</th>
<th>Email</th>
<th>Contact Phone</th>
<th>Responsible for</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erik Dunmire</td>
<td>Team Member</td>
<td><a href="mailto:erik.dunmire@marin.edu">erik.dunmire@marin.edu</a></td>
<td>x7536</td>
<td>Engineering</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### II. Program Review Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Committee (Chairs)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chris Schultz</td>
<td>Curriculum Committee Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blaze Woodlief</td>
<td>Educational Planning Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laura McCarty and Erik Dunmire</td>
<td>Facilities Committee Co-Chairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sara McKinnon</td>
<td>Planning and Resource Allocation Committee Co-Chair/Academic Senate President</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>Planning and Resource Allocation Committee Co-Chair/Instructional Equipment Committee Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sara McKinnon, Yolanda Bellisimo and Anne Gearhart</td>
<td>Program Review Committee Chair and SLO Coordinators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>Student Access and Success Committee Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael Irvine</td>
<td>Tech Committee Chair</td>
<td></td>
<td></td>
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</tbody>
</table>

### III. Vice President of Academic Affairs

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nick Chang</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### IV. Board of Trustees President

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva Long</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Instructional Equipment

ENGG-2011

This section will be filled out by faculty and reviewed by the Department Chair, the Area Dean, the Instructional Equipment Committee, IPC and Budget.

Please enter items that will be used over a period of semesters BY STUDENTS.. (Note: These should be NEW items that you are requesting one time only - not ongoing or consumable. Ongoing and consumable requests go under "Other Instructional Equipment". Technology-related requests should go under "Technology Requests").

Select whether the item is less than or more than $200 each. If you are a large discipline with several areas, please include which area this item is for. Include Tax, Shipping and Handling in the total cost for each item.

Importance:
- 'A' means that your discipline cannot teach your course(s) without the requested equipment.
- 'B' means that your course(s) would be greatly enhanced with the requested equipment.
- 'C' means that you would like this piece of equipment for your course(s) but can wait for a future academic year.

In addition, how many times have you requested this item, but you have not received it?

### I. Instructional Equipment/Materials Requirements

<table>
<thead>
<tr>
<th>Importance</th>
<th>Priority</th>
<th>To Support</th>
<th>Category</th>
<th>Discipline</th>
<th>Area</th>
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<tr>
<td>A</td>
<td>01</td>
<td>Over</td>
<td>$200</td>
<td>Engineering</td>
<td>1</td>
<td>Classes Each</td>
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**Description and part number for ordering:**
CF 1100C 12x10x10" Muffle Furnaces w/ Kanthal Heating Elements Across International, Item #: CF1100.12.10.10

<table>
<thead>
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<th>Qty.</th>
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<th>Total:</th>
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<td>$399.00</td>
<td>$0.00</td>
<td>$4,389.00</td>
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**One-time expenses:** (e.g. construction, electrical, installation)
N/A

**On-going Expenses:** (e.g. maintenance, repairs, staffing, and/or upgrades)
N/A

**Item to be shared with the following Department/Program:** (Include any shared expenses)
N/A

**Do you have space for this equipment?**
Yes

**Justification for Item (See Rating Rubric)**
1. Is this equipment required to meet Title 5 and/or Ed Code? If so, how? (Cite code)
2. Is this equipment required to meet any local, state or federal Health and Safety Code? If so, how? (Cite code)

If there are any codes that require us to protect students from serious injury or to prevent potential building fires, then they would apply.
There is currently only one reliable furnace (circa 1975-1980) for thermal treatment in the Materials Engineering lab; it is too small for the samples that must be placed in it, creating safety hazards for students. Additionally, the interior lining began to crack and decompose several years ago, posing additional hazards.

There are 2 other older furnaces (circa 1950s) that are occasionally used out of necessity, but the temperature control and measurement on these is unreliable, and they also have cracked linings and compartments that are too small for many of the samples that are treated.

Since these furnaces are typically operated at temperatures of 800-1100°C (1500-2000°F), the incorrect chamber size and cracked lining causes awkwardness for students that increases their risk for burns and other injuries. The cracked insulation lining also probably causes the outer portion of the furnace to operate above its design temperature, possibly increasing risk of fire.

2. How will the quality of instruction be improved for student learning and success? Is it necessary for students to succeed in a series of courses?

This item is needed to replace antique, unreliable, and unsafe furnaces for thermal treatment of specimens in Materials Lab course. Thermal treatment of metals is a central component of the laboratory portion of the Materials Science course, which is a required transfer course for students in most disciplines of Engineering.

3. How will access for students be improved? How many students (annually) will benefit from this request? Is it required to accommodate existing students? Would it be vital to attracting new students?

Acquiring 3 new furnaces, in a range of sizes suitable for current experimental uses, would greatly improve the safety and educational experience for the materials students.

Required to accommodate approximately 8-10 existing students per year in the Engineering Materials course. New equipment in a new engineering lab may help to attract additional students to the program; dilapidated 1950s & 60s equipment in a new engineering lab may deter students.

4. What student learning or other outcomes are expected? Is it important to the achievement of student goals? How will these outcomes be measured for future planning? What data or evidence supports your request?

The two most relevant program SLOs are:

design and conduct experiments, as well as to analyze and interpret data.

use the techniques, skills, and modern engineering tools necessary for engineering practice.

More importantly, most Engineering majors are required to take the Materials course to transfer, and any articulated Materials course must have a lab, which must include heat treatment of metals as part of the lab curriculum.

5. Additional Justification for this item:
First started requesting this item in 2007-2008 Program Review.

I. Instructional Equipment/Materials Requirements

<table>
<thead>
<tr>
<th>Importance</th>
<th>Priority</th>
<th>Category</th>
<th>Discipline</th>
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<tbody>
<tr>
<td>A</td>
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CF 1100C 12x8x8" Muffle Furnaces w/ Kanthal Heating Elements Across International, Item #: CF1100.12.8.8

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One-time expenses: (e.g. construction, electrical, installation)

N/A

On-going Expenses: (e.g. maintenance, repairs, staffing, and/or upgrades)

N/A

Item to be shared with the following Department/Program: (Include any shared expenses)

N/A

Do you have space for this equipment? Yes

Justification for Item (See Rating Rubric)

1. Is this equipment required to meet Title 5 and/or Ed Code? If so, how? (Cite code)
   Is this equipment required to meet any local, state or federal Health and Safety Code? If so, how? (Cite code)

   See Justification for item #1

2. How will the quality of instruction be improved for student learning and success? Is it necessary for students to succeed in a series of courses?

3. How will access for students be improved? How many students (annually) will benefit from this request? Is it required to accommodate existing students? Would it be vital to attracting new students?

4. What student learning or other outcomes are expected? Is it important to the achievement of student goals? How will these outcomes be measured for future planning? What data or evidence supports your request?

5. Additional Justification for this item:
I. Instructional Equipment/Materials Requirements

<table>
<thead>
<tr>
<th>Importance</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>03</td>
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</table>

| Description and part number for ordering: |
| Tinius-Olsen Model H50kS Materials Testing Machine |

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Unit Cost:</th>
<th>Tax:</th>
<th>Shipping:</th>
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</table>

One-time expenses: (e.g. construction, electrical, installation)

possible installation expense in new building (weighs approx 500 lbs)

On-going Expenses: (e.g. maintenance, repairs, staffing, and/or upgrades)

none beyond current lab tech

Item to be shared with the following Department/Program: (Include any shared expenses)

May be shared occasionally with other engineering classes and with physics classes.

Do you have space for this equipment?  Yes

Justification for Item (See Rating Rubric)
1. Is this equipment required to meet Title 5 and/or Ed Code? If so, how? (Cite code)
   Is this equipment required to meet any local, state or federal Health and Safety Code? If so, how? (Cite code)

   No

2. How will the quality of instruction be improved for student learning and success? Is it necessary for students to succeed in a series of courses?

   This instrument would be a primary piece of testing equipment in the Engineering Materials course, which is a transfer requirement for most engineering majors. Testing of material specimens is a core function within the lab portion of the course. At present, we use an older (1950s?) analog hydraulic testing machine, which although it is simple to operate and allows very high capacity testing (300kN), is not capable of performing many testing modalities that can be accomplished with modern digital electromechanical systems. As a result, students are not exposed to the full range of testing possibilities, nor do they get to experience the type of testing apparatus that they will encounter in any modern engineering lab (academic or industrial). All university and most community college engineering programs have modern testing machines.

   Supplementing our older hydraulic machine with a newer mid-capacity testing machine would greatly enhance the educational experience for materials students. Because we are moving into a brand new engineering lab, this seems the most appropriate time to upgrade our equipment.
3. How will access for students be improved? How many students (annually) will benefit from this request? Is it required to accommodate existing students? Would it be vital to attracting new students?

Anywhere from 10-100 students per year, depending upon use by other physics/engineering classes.

If our aim is to grow the engineering program, this item would be essential to attracting new students.

4. What student learning or other outcomes are expected? Is it important to the achievement of student goals? How will these outcomes be measured for future planning? What data or evidence supports your request?

The two most relevant program SLOs are:

Design and conduct experiments, as well as to analyze and interpret data.

Use the techniques, skills, and modern engineering tools necessary for engineering practice.

5. Additional Justification for this item:

I. Instructional Equipment/Materials Requirements

<table>
<thead>
<tr>
<th>Importance</th>
<th>Priority</th>
<th>To Support Annually:</th>
<th>Category</th>
<th>Discipline Area</th>
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<tbody>
<tr>
<td>B</td>
<td>04</td>
<td>Over $200</td>
<td>1 Classes Each</td>
<td>Engineering</td>
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**Description and part number for ordering:**
CF 1100C 12x8x5" Muffle Furnaces w/ Kanthal Heating Elements Across International, Item #: CF1100.12.8.5

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<th>Qty.</th>
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<td>$0.00</td>
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</table>

**One-time expenses:** (e.g. construction, electrical, installation)

N/A

**On-going Expenses:** (e.g. maintenance, repairs, staffing, and/or upgrades)

N/A

**Item to be shared with the following Department/Program:** (Include any shared expenses)

N/A

**Do you have space for this equipment?**

Yes

**Justification for Item (See Rating Rubric)**

1. Is this equipment required to meet Title 5 and/or Ed Code? If so, how? (Cite code)
1. Is this equipment required to meet Title 5 and/or Ed Code? If so, how? (Cite code)

Is this equipment required to meet any local, state or federal Health and Safety Code? If so, how? (Cite code)

See Justification for item #1.

2. How will the quality of instruction be improved for student learning and success? Is it necessary for students to succeed in a series of courses?

3. How will access for students be improved? How many students (annually) will benefit from this request? Is it required to accommodate existing students? Would it be vital to attracting new students?

4. What student learning or other outcomes are expected? Is it important to the achievement of student goals? How will these outcomes be measured for future planning? What data or evidence supports your request?

5. Additional Justification for this item:
Program Summary
ENGG-2011

Instructions: after reviewing your data and reports from all other sections of your program review, use this form to briefly summarize all of the information you have provided by closing with your concluding remarks (e.g. an executive one-page summary) for your entire program review.

I. Assessment of Previous Program Reviews:

1. What resources have you been granted from your previous program reviews?
2. Please assess how these resources have been used to improve access, learning outcomes and student success in your program?
3. What changes have you implemented based on previous program reviews?
4. What results have you found?

I believe the only item that Engineering has been granted since the inception of program review is one laptop computer. It has been very useful as an interface to the equipment in the Materials lab, as well as for just-in-time data analysis by students during the experiments.

I am confident that it improved the learning experience for these students. When we move to the combined physics-engineering lab in the new building, the presence of multiple computers as well as possibly wireless internet will be an even further improvement. (For example, students will be able to look up material properties during the lab period.)

Most of the changes that have taken place since earlier program reviews have been deletion and revision of Engineering courses. This process will continue in the near future, since the SB-1440/TMC/C-ID process is currently taking place for Engineering, and will likely be completed by end of spring semester.

II. Requests Summary:

1. Please summarize the main requests you have made in this program review in order of your priority starting with the most important one.
2. Summarize briefly why you want each one.
3. Summarize your overall rationale.

We have requested a number of equipment items (3 furnaces for heat treatments and 1 modern materials testing machine) for the Engineering materials lab that are needed to improve the safety of students as well as their educational experience. Because we are moving into a new building, this seems the most appropriate time to make such upgrades, despite the relatively small number of students served by this equipment.

III. Other concluding remarks.