CEE List of Undergraduate Laboratory Needs

The following table contains the requested items for CEE in the format requested by the Dean’s office. The amount requested, $178,554, is the same as the amount allocated to CEE. Of the requested amount $161,508 is allocated to the undergraduate equipment needs detailed below and $17,046 is allocated to emergency funds to cover for unanticipated undergraduate laboratory needs or to fund some of the requested but yet unfunded undergraduate laboratory needs. The prioritized list of requests is shown on page 3 of this document and more detailed descriptions of each request are given starting on page 4. Notice that some of the items in the prioritized list had to be broken down in the table below to fit the requested format. In every case, however, the specific items requested in each line item have been referenced to the appropriate item and page in the more detailed description section of the document. Unless otherwise noted, 100% undergraduate use is assumed. Whenever non-undergraduate use is anticipated, the dollar amount requested represents only the estimated percentage of the undergraduate student use, which is shown in parenthesis after the item description on the same line. The requested funds will be matched with $7,400 from other sources to account for non-undergraduate student use.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab. Equipment &gt; $5,000</td>
<td>(itemize each piece of equipment, lab and function)</td>
<td></td>
</tr>
<tr>
<td>Structures lab – Digital Extensometer frame for modulus and Poisson ratio measurement (item 44a, page 9) <strong>(Matching funds $1,500)</strong></td>
<td>$13,500</td>
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<tr>
<td>Support for all labs – Computer operated plasma cutting system (item 48, page 10) <strong>(Matching funds $4,000)</strong></td>
<td>$20,000</td>
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<tr>
<td>Regular Personal Services</td>
<td></td>
<td></td>
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<tr>
<td>Technician assistance (item 41, page 9): Mitch Pinkerton</td>
<td>$50,000</td>
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<tr>
<td><strong>Total Lab Equipment &gt; $5,000 and Regular Personnel Services</strong></td>
<td><strong>$83,500</strong></td>
<td></td>
</tr>
<tr>
<td>Casual Hires (specify function)</td>
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<td></td>
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<tr>
<td><strong>Total Casual Hires</strong></td>
<td><strong>$0</strong></td>
<td></td>
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<tr>
<td>Student Assistants (specify the labs)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Total Student Assistants</strong></td>
<td><strong>$0</strong></td>
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<tr>
<td>Lab. materials and supplies and lab operations (specify the labs)</td>
<td></td>
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<tr>
<td>Environmental Lab – Materials and supplies for CEE 330 (items 1-16, 18, pages 4-5)</td>
<td>$8,359</td>
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<tr>
<td>Geotechnical Lab – CEE 355 (items 22,23,27-30, page 6)</td>
<td>$4,774</td>
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<tr>
<td>Structures and concrete materials lab – Materials, supplies, and safety equipment for CEE 370, CEE 375, and CEE 485 (item 42, page 9)</td>
<td>$11,000</td>
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</tr>
<tr>
<td>Pavement lab – Material, supplies, and safety equipment for CEE461 (item 35, page 8)</td>
<td>$2,000</td>
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<tr>
<td>Pavement Lab: Digital Pressure Manometer NIST Certified. Item 36 on page 8</td>
<td>$500</td>
<td></td>
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<tr>
<td>Pavement Lab: Infrared Digital Thermometer. Item 38 on page 8</td>
<td>$200</td>
<td></td>
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<tr>
<td>Item Description</td>
<td>Cost</td>
<td></td>
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<tr>
<td>--------------------------------------------------------------------------------</td>
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<tr>
<td>CEE 270 demo tools: PASCO Introductory Mechanics System. Item 46b, page 10</td>
<td>$750</td>
<td></td>
</tr>
<tr>
<td><strong>Total Lab materials and supplies and lab operations</strong></td>
<td><strong>$27,583</strong></td>
<td></td>
</tr>
<tr>
<td><strong>• Equipment and Furniture Repairs &amp; Maintenance</strong></td>
<td></td>
<td></td>
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<tr>
<td>Structures lab – Equipment maintenance (item 43, page 9) (90% undergraduate</td>
<td>$5,400</td>
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<tr>
<td>student use) (Matching funds $600)</td>
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<tr>
<td>Other laboratory expenses (item 47, page 10) (Matching funds $300)</td>
<td>$2,700</td>
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<tr>
<td>Superpave Gyratory Compactor repair and calibration (item 39, page 8) (90%</td>
<td>$9,000</td>
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<tr>
<td>undergraduate student use) (Matching funds $1,000)</td>
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<td></td>
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<tr>
<td><strong>Total Equipment and Furniture Repairs and Maintenance</strong></td>
<td><strong>$17,100</strong></td>
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<tr>
<td><strong>• Computer Repairs &amp; Maintenance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Computer Repairs &amp; Maintenance</strong></td>
<td><strong>$0</strong></td>
<td></td>
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<tr>
<td><strong>• Computer Software</strong></td>
<td></td>
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<tr>
<td>CEE 270 demo tools: PASCO DataStudio software site license (to be used</td>
<td>$400</td>
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<td>together with the PASCO Structures set already available in the department.)</td>
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<tr>
<td>Item 46a on page 10</td>
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<tr>
<td>Senior Design Studio lab (cost of Civil 3D license renewal in item 49 on page 10)</td>
<td>$2,500</td>
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<tr>
<td><strong>Total Computer Software</strong></td>
<td><strong>$2,900</strong></td>
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<tr>
<td><strong>• Computer Software License Fees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Computer Software License Fees</strong></td>
<td><strong>$0</strong></td>
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<tr>
<td><strong>• Lab. Equipment for controlled Property (&lt;$5,000)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Environmental Lab: Dissolved oxygen meter and probe – replacement of old</td>
<td>$2,225</td>
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<tr>
<td>unit (measures dissolved oxygen in liquid samples) Item 17 on page 5</td>
<td></td>
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<tr>
<td>Geotechnical Lab : Ro-Tap RX Sieve Shaker . Item 19 on page 6</td>
<td>$3,950</td>
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<tr>
<td>Geotechnical Lab: Bench Top Drying Oven – 2 at $1,500 each. Item 20 on page 6</td>
<td>$3,000</td>
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<tr>
<td>Geotechnical Lab: Precision Electronic Balances – 4 at $1,000 each. Item 21 on</td>
<td>$4,000</td>
<td></td>
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<tr>
<td>page 6</td>
<td></td>
<td></td>
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<tr>
<td>Geotechnical Lab: Compaction extruder jack. Item 24 on page 6</td>
<td>$700</td>
<td></td>
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<tr>
<td>Geotechnical Lab: Large capacity balance. Item 25 on page 6</td>
<td>$2,000</td>
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</tr>
<tr>
<td>Geotechnical Lab: High vacuum pump. Item 26 on page 6</td>
<td>$750</td>
<td></td>
</tr>
<tr>
<td>Pavement Lab: Precision balance. Item 37 on page 8</td>
<td>$1,300</td>
<td></td>
</tr>
<tr>
<td>Senior Design Studio lab (cost of computers, monitors, and projector in item 49</td>
<td>$12,500</td>
<td></td>
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<tr>
<td>on page 10.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Lab. Equipment for controlled Property (&lt;$5,000)</strong></td>
<td><strong>$30,425</strong></td>
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</tbody>
</table>
Prioritized list of CEE undergraduate laboratory needs

The list below is an assessment of equipment needs for the undergraduate CEE labs as of the fall semester of 2010.

1. Environmental Lab – Materials and supplies for CEE 330 (items 1-18, pages 4-5) .......... $ 10,584
2. Geotechnical Lab – CEE 355 (items 19-30, page 6) ......................................................... $ 19,174
3. Structures and concrete materials lab – Materials, supplies, and safety equipment for CEE 370, CEE 375, and CEE 485 (item 42, page 9) ......................................................... $ 11,000
4. Pavement lab – Material, supplies, and safety equipment for CEE461 (item 35, page 8) ................................................................................................................................. $ 2,000
5. Technician assistance (item 41, page 9) ............................................................................ $ 50,000
6. Pavement lab – Digital pressure manometer, precision balance, and infrared digital thermometer (items 36-38, page 8) ................................................................. $ 2,000
7. CEE 270 demo tools (item 46, page 10) ............................................................................. $ 1,150
8. Structures lab – Equipment maintenance (item 43, page 9) ............................................. $ 6,000
9. Structures lab – Digital Extensometer frame for modulus and Poisson ratio measurement (item 44a, page 9) ................................................................. $ 15,000
10. Support for all labs – Computer operated plasma cutting system (item 49, page 10) .................. $ 24,000
11. Senior Design Studio lab (cost of computers, monitors, and projector in item 49 on page 10.) ................................................................................................................................. $ 15,000
12. Pavement Lab – Superpave Gyratory Compactor repair and calibration ......................... $ 10,000
13. Other laboratory expenses (item 47, page 10) .................................................................... $ 3,000
14. Concrete, Pavement and Structures Labs – Mezzanine Build-out (item 50, page 11) – Architectural and Engineering Plans (10% of estimated total of $100,000) ................. $ 10,000
15. Concrete, Pavement and Structures Labs – Mezzanine Build-out (item 50, page 11) – Construction ............................................................................................................ $ 90,000
16. Structures lab – Hydraulic power unit (item 44b, page 9) ................................................... $ 40,000
17. Transportation Lab – Chairs (item 34, page 7) ................................................................ $ 1,500
18. Structures lab – Replacement TestStarII controller (item 45, page 9) .............................. $ 50,000
19. Pavement Lab – Fume Hood (item 40, page 9) ................................................................... $ 15,000
20. Hydraulics lab – Ceiling crane (item 33, page 7) ................................................................. $ 100,000
21. Replacement triaxial system (item 31, page 6) ................................................................. $ 30,000
22. Hydraulics lab – Upgrade of existing ceiling crane (item 32, page 7) (another source of funding was obtained for this request.) ................................................................. $ 25,000

Total items 1-13 ......................................................................................................................... $ 168,908
Minus matching funds contribution .......................................................................................... $ 7,400

Current allocation to undergraduate laboratory needs from lab fees ........................................ $ 161,508
Plus emergency funds for undergraduate equipment needs .................................................... $ 17,046
Total fees allocated to CEE ....................................................................................................... $ 178,554

Current undergraduate laboratory needs .................................................................................. $ 530,408

Environmental Lab
All for CEE 330 – reqd. class offered every semester w/2 sec. @ 20 max. ea.

1. Cartridges for water purification system
   1 set $1,035.00 Cartridges for the water purification system $1,050/set. Use 2 sets/year.
   $2,100/year

2. Analytical Balance calibration
   $60/balance. Actively use 3 balances.
   $180/year

3. Vacuum filtration apparatus
   2 sets at $242 ea.
   $484 – one time

4. Safety materials:
   a. disposable aprons $80/100. Use 100/year
   b. gloves $25/100. Use 100/year
   c. goggles $4.00 each. Use 60/year
   d. antimicrobial hand soap $70/gallon. Use 1 gallon/year
   e. table top disinfectant $110/gallon. Use 1 gallon/year
   f. autoclave bags $258/200. Use 200/year
   $823/year

5. Chemicals such as sodium hydroxide, hydrochloric acid, etc.
   $500/year

6. Replacement of glassware
   $500/year

7. Bacterial agar $66/100g. Use 100g/year.
   $60/year

   $130/year

9. Glass fiber filters $45/100. Use 400/year.
   $180/year

10. 0.45um filters $139/100. Use about 150/year
    $209/year

    $130/year

12. HACH powder pillows $28.25/100. Use 300/year.
    $85/year

13. Lamp replacements for the HACH spectrophotometer


a. Tungsten $125
b. Deuterium $810
$935/every 3 years

14. Repair of the BOD incubator $400
   $400 – one time

15. Repair of the steam table $300
   $300 – one time

16. Turbidimeter calibration standards
    $178/every 3 years

17. Dissolved oxygen meter and probe – replacement of old unit
    Measures dissolved oxygen in liquid samples
    $2,225.00 – one time

18. pH/ISE meter – replacement of old unit
    $1,165 – one time

TOTAL for Environmental Lab: $10,584
Geotechnical Lab (CEE 355)

19. Ro-Tap RX Sieve Shaker  
   $3950

20. Bench Top Drying Oven – 2 at $1,500 each  
   $3,000

21. Precision Electronic Balances – 4 at $1,000 each  
   $4,000

22. 8 Stainless #200 Sieves  
   $800

23. Varying size brass sieves – 42 at $55 each  
   $2,310

24. Compaction extruder jack  
   $700

25. Large capacity balance  
   $2,000

26. High vacuum pump  
   $750

27. Non-mercury thermometers – 8 at $110 each  
   $880

28. Poly. Graduated Cylinders – 8 at $18 each  
   $144

29. Sodium Hexametaphosphate  
   $40

30. Replacement tools and supplies  
   $600

31. Replacement triaxial system  
   $30,000
Hydraulics lab - CEE320, CEE421 (open channel flow) and graduate courses:

The main undergraduate teaching activities in this lab are the CEE320 experiments. In addition, other courses including CEE421 and some graduate courses (fluid mechanics, ground water hydrology) also use the lab for one or two experiments or demos from time to time.

Requests:

32. Upgrade of the existing ceiling crane in the hydraulics lab from manual operation to automated operation. The crane is needed to move equipment in the lab for both teaching and research. The current crane manual operation is very difficult for anyone to use because it requires a great human force to pull the crane to move in the lab. $25,000

33. Purchase and installation of a ceiling crane (smaller than the existing one) to cover the area above the wave tank in the hydraulics lab. Currently, there is no crane available over this area. The wave tank is used for experimental demos for undergraduate students as well as demos to high school students during open house. It is also used for graduate student thesis research and faculty research projects. The wave tank is elevated from the floor. It is very difficult for the students and faculty members to move heavy equipment and experimental models in and out the wave tank. The manual lifting of large and heavy equipment around this area is a safety hazard to the students and staff. $100,000

Traffic and Transportation lab

34. The chairs at the Traffic and Transportation lab (TTL) are decapitated and need replacement. Past purchases in the $30-$50 range proved to be poor choices as the chairs begin to sag or break after one or two years of use. Ten (10) office chairs priced in the $100 to $150 for better comfort and longevity, thus the requested budget is $1,500.
Pavement Laboratory (CEE 461)

35. Materials and Supplies (annual basis): heat resistant globes, nitrile globes, asphalt emulsifier (for cleaning instruments), filter papers, disposable trays, paper towels, construction paper, spatulas, spoons, mixer whip, aggregate, asphalt cement, test supplies, sieves, gyratory molds, mixer bowl, glassware, equipment maintenance, etc. $2,000/year

36. Digital Pressure Manometer NIST Certified
   $500.00

37. Precision balance
   $1,300

38. Infrared Digital Thermometer
   $200

39. Superpave Gyratory Compactor repair and calibration. The compactor cannot hold the angle of gyration which is an essential component of the mix design, thus invalidating the test results for the laboratory classes. We have had this problem for a few years. Parts will need to be replaced and calibration equipment will need to be acquired. $10,000

40. Fumehood:
   A fume hood with sash is required for cleaning with solvents such as the RTFO bottles used in the RTFO (Rolling Thin Film Oven) test. This test is currently studied in CEE 461 but is not demonstrated because of the cleaning up process. In addition, a fume hood can be used for extraction of asphalt from field mixes for further testing. In general, the capabilities of dealing with chemicals in the Structures, Concrete, and Pavement labs are currently inadequate. $15,000
Structures Laboratory

41. Technician assistance - One laboratory/equipment technician in addition to general funds department technicians - $50,000/year.

42. Materials, Supplies and safety equipment required on an annual basis: (Essential for undergrad laboratory sessions.)
   CEE370 - $3,000 (Metal test specimens, strain gages, beam test specimens, etc.)
   CEE375 - $3,000 (Aggregate, Cement, Test supplies, Sieves, Cylinder molds, etc.)
   CEE485 - $5,000 (Reinforcing steel, formwork, concrete, placement equipment, etc.)

43. Equipment maintenance required on an annual basis: (Required for equipment used in undergrad laboratories and research)
   Calibration of load cells and extensometers - $6,000 per annum.

44. Immediate equipment needs (within 12 months):
   a) Digital Extensometer frame for modulus and Poisson ratio measurement of concrete cylinders - $15,000. Existing manual equipment using dial gages is old, unreliable, and so inaccurate that the results seldom concur with theoretical estimates, leading to doubt and confusion for students in CEE370 and CEE485.

   b) Hydraulic power unit for hydraulic test system in Structures Laboratory - $40,000. Existing pump is 40 years old (installed when Holmes Hall built in 1970-71). If and when it fails, CEE370 and CEE485 will have no way to test material specimens.

45. Mid-term equipment needs (within 36 months):
   a) Replacement TestStarII controller for hydraulic test system in Structures Laboratory - $50,000. For the past 6 years we have had two controllers capable of running the test system. Failure of one controller meant we could still run the laboratory tests. However, the older (1995) controller has now failed and is beyond repair. We are running on the second (2004) controller. Any failure of this controller could shut down laboratory testing for 2 to 3 months while it is shipped to the mainland for repair, as second controller is required to avoid downtime for the laboratory experiments.
Other:

Statics:
46. Statics education tools:
   a. PASCO DataStudio software site license (to be used together with the PASCO Structures set already available in the department.)
      $400
   b. PASCO Introductory Mechanics System
      $750

47. Other Laboratory Operations: other common lab expenses for all labs involving safety, repairs, etc.
   $3,000/year

48. Computer operated plasma cutting system
   What it does: Plasma technology cuts through steel (and other metals) up to 1" thick like butter. Coupling plasma with a computerized control system allows the fabrication of complex pieces, big or small, which can be used in almost any application such as structural steel and instrument and test setup fabrication.
   Benefits: Having a computerized plasma system would expand the capability of the shop to provide advanced on-site metal fabrication. It would make the creation of a CEE486 (structural steel) lab economically viable. Additionally, custom project work is frequently sent to outside vendors because it is simply not possible to do with current equipment. It would also cut the time needed to fabricate pieces down to approximately a third of that need with traditional means. Currently, there is no system like this on campus. We already own the basic plasma system and this would add computer control to it.
   $24,000

49. Senior Design Studio lab
   The faculty teaching the senior design project, who needs to use Civil 3D 2010 version, has experienced some continuous problems with the HP lab. For example, the software has not worked in that lab for 3+ weeks, so no homework could be assigned. The computers in the Kim lab work pretty well but they are only good for instruction. Thus, it has been proposed to create a Senior Design Studio by renaming H144 which already has controlled access (code). The key items needed are 10 new computers (should last 3 years), not fancy or expensive, just new with typical fast processor loaded with AutoCAD 2010 incl Civil 3D and a decent networked laser printer and a ceiling-mounted LCD projector (to practice presentations). Costs: 10 computers at $800 ea, 10 monitors 22" flatscreen $200 ea, 10 AutoCAD licenses at $250 ea (annual), 1 networked laser printer that can do 11 x 17 at $2500? = total $15,000. This would be great for CEE 490 this Spring and for 489B next Fall.
Pavement, Concrete, and Structures Labs

50. Mezzanine Build-out:
The Asphalt, Concrete Materials, and Structures Labs are co-located in essentially one laboratory area. Space is very tight, and students have complained about the situation in the last exit interviews. Building a mezzanine over the area currently occupied by the Asphalt Materials and Concrete Materials labs will help to address partially this problem. The mezzanine will improve the learning environment for students during labs and research activities, as well as protect delicate and expensive equipment from damage during material staging.

$100,000