



## Principles and Practice of Engineering Civil BREADTH Exam Review

### Instructor Information

Colorado is one of several states that is hoping to offer a PE exam review course for the civil engineering exam this fall. The review course has been developed by NSPE and Kaplan AEC Education and we anticipate adding additional disciplines in the future.

PEC Instructor Specifications: Ideally, we would like a P.E. who could be the 'lead' instructor and teach one or two of the required sections and who could also coordinate delivery of the other parts with other instructors.

### Review Session Schedule/Sessions

**\*Below is a breakdown of subject matter within each instructor session; please complete the application found on the last page of this packet.**

Review Session Date:	Time:	Discipline:
Saturday, March 7, 2009	8:00 a.m. - 5:00 p.m.	Construction (Parts 1 & 2)
Saturday, March 14, 2009	8:00 a.m. - 5:00 p.m.	Geotechnical (Parts 1 & 2)
Saturday, March 21, 2009	8:00 a.m. - 5:00 p.m.	Structural (Parts 1 & 2)
Saturday, March 28, 2009	8:00 a.m. - 5:00 p.m.	Transportation
Saturday, April 4, 2009	8:00 a.m. - 5:00 p.m.	Water Resources (Parts 1 & 2)
Saturday, April 18, 2009	8:00 a.m. - 5:00 p.m.	Water Resources (Parts 2 & 3)

- The commitment will be for approximately 6-8 hours of instruction a week (Saturday's) depending on how many subject areas you are selected to teach. PEC has provided an 8-hour time block for each session beginning at 8:00 a.m. through 5:00 p.m. Instructors should review the course materials and notify the PEC office if this is not enough time in order to make schedule adjustments.
- Instructors will be provided with a resource guide, learning objectives, timed outlines, sample exams, and PowerPoint presentations. Instructors will also be able to participate in an on-line training session just for instructors teaching the course.
- Additionally, PEC will compensate each instructor **\$150.00 per day of instruction**. All instructor payments will be mailed after the scheduled review session.

**All Exam Review Sessions will be located at:**

**SEH, Inc.**  
2000 S Colorado Blvd #6000  
Tower 1  
Denver, CO 80222  
(I-25 & Colorado Blvd.)

**Please submit the application found on the last page of this packet along with a copy of your resume to the PEC office by Friday, December 12, 2008, if you are willing to assist PEC in this exciting new program.**

**National Council of Examiners for Engineering and Surveying  
Principles and Practice of Engineering Civil BREADTH Exam Specifications  
Effective Beginning with the April 2008 Examinations**

- I. CONSTRUCTION** **20%**
- A. Earthwork Construction and Layout
    - i. Excavation and embankment (cut and fill)
    - ii. Borrow pit volumes
    - iii. Site layout & control
  - B. Estimating Quantities and Costs
    - i. Quantity take-off methods
    - ii. Cost estimating
  - C. Scheduling
    - i. Construction sequencing
    - ii. Resource scheduling
    - iii. Time-cost trade-off
  - D. Material Quality Control and Production
    - i. Material testing (e.g., concrete, soil, asphalt)
  - E. Temporary Structures
    - i. Construction loads
- II. GEOTECHNICAL** **20%**
- A. Subsurface Exploration and Sampling
    - i. Soil classification
    - ii. Boring log interpretation (e.g., soil profile)
  - B. Engineering Properties of Soils and Materials
    - i. Permeability
    - ii. Pavement design criteria
  - C. Soil Mechanics Analysis
    - i. Pressure distribution
    - ii. Lateral earth pressure
    - iii. Consolidation
    - iv. Compaction
    - v. Effective and total stresses
  - D. Earth Structures
    - i. Slope stability
    - ii. Slabs-on-grade
  - E. Shallow Foundations
    - i. Bearing capacity
    - ii. Settlement
  - F. Earth Retaining Structures
    - i. Gravity walls
    - ii. Cantilever walls
    - iii. Stability analysis
    - iv. Braced and anchored excavations
- III. STRUCTURAL** **20%**
- A. Loadings
    - i. Dead loads
    - ii. Live loads
    - iii. Construction loads
  - B. Analysis
    - i. Determinate analysis
  - C. Mechanics of Materials
    - i. Shear diagrams
    - ii. Moment diagrams
    - iii. Flexure
    - iv. Shear
    - v. Tension
    - vi. Compression
    - vii. Combined stresses

viii. Deflection	
D. Materials	
i. Concrete (plain, reinforced)	
ii. Structural steel (structural, light gage, reinforcing)	
E. Member Design	
i. Beams	
ii. Slabs	
iii. Footings	
<b>IV. TRANSPORTATION</b>	<b>20%</b>
A. Geometric Design	
i. Horizontal curves	
ii. Vertical curves	
iii. Sight distance	
iv. Superelevation	
v. Vertical and/or horizontal clearances	
vi. Acceleration and deceleration	
<b>V. WATER RESOURCES AND ENVIRONMENTAL</b>	<b>20%</b>
A. Hydraulics – Closed Conduit	
i. Energy and/or continuity equation (e.g., Bernoulli)	
ii. Pressure conduit (e.g., single pipe, force mains)	
iii. Closed pipe flow equations including Hazen-Williams, Darcy-Weisbach Equation	
iv. Friction and/or minor losses	
v. Pipe network analysis (e.g., pipeline design, branch networks, loop networks)	
vi. Pump application and analysis	
B. Hydraulics – Open Channel	
i. Open-channel flow (e.g., Manning’s equation)	
ii. Culvert design	
iii. Spillway capacity	
iv. Energy dissipation (e.g., hydraulic jump, velocity control)	
v. Stormwater collection (e.g., stormwater inlets, gutter flow, street flow, storm sewer pipes.)	
vi. Flood plains/floodways	
vii. Flow measurement – open channel	
C. Hydrology	
i. Storm characterization (e.g., rainfall measurement and distribution)	
ii. Storm frequency	
iii. Hydrographs application	
iv. Rainfall intensity, duration, and frequency (IDF) curves	
v. Time of concentration	
vi. Runoff analysis including Rational and SCS methods	
vii. Erosion	
viii. Detention/retention ponds	
D. Wastewater Treatment	
i. Collection systems (e.g., lift stations, sewer networks, infiltration, inflow)	
E. Water Treatment	
i. Hydraulic loading	
ii. Distribution systems	
<b>TOTAL:</b>	<b>100%</b>

**Notes:**

*The examination is developed with questions that will require a variety of approaches and methodologies including design, analysis, and application. Some questions may require knowledge of engineering economics.*

*The knowledge area specified under 1, 2, 3, etc., are examples of kinds of knowledge, but they are not exclusive or exhaustive categories.*

*The breadth (AM) exam contains 40 multiple-choice questions. Examinee works all questions.*

*Score results are combined with depth exam results for final score.*



**Professional Engineers  
of Colorado**

## PE Exam Review - Instructor Application

Please complete the following form and submit to the address noted below. Please be sure to include a copy of your resume for review. The PEC Professional Development Committee will review applications and notify all instructors of the selection by **Friday, December 12, 2008.**

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

**\*Please attach a copy of your resume**

**Please select the review session date and discipline you are interested in instructing:**

	Review Session Date:	Time:	Discipline:
<input type="checkbox"/>	Saturday, March 7, 2009	8:00 a.m. - 5:00 p.m.	Construction (Parts 1 & 2)
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<input type="checkbox"/>	Saturday, April 18, 2009	8:00 a.m. - 5:00 p.m.	Water Resources (Parts 2 & 3)

Once all applications have been received and a selection has been made, an instructor contract will be mailed directly to you containing more detailed information and resource guides for instructing.

Thank you for your support!

Jack Gianola, P.E.  
Professional Development Committee Chair  
Professional Engineers of Colorado

**Please submit application to:**  
Professional Engineers of Colorado  
3030 W. 81<sup>st</sup> Avenue  
Westminster, CO 80031  
Phone: 303-480-1160  
Fax: 303-458-0002