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INCOSE Webinar Series

Wednesday 17th July 2019 – Webinar 127

Professional Licensing of Systems Engineers



Caitlin Kenney



ENGINEERING LICENSURE

Professional Licensing of Systems Engineering

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INCOSE Webinar

July 17, 2019



NCEES
*advancing licensure for
engineers and surveyors*



Write the equation of
and position of
time in closed form

$$\Sigma F = D - W =$$

where $D = \text{drag force}$
 $W = \text{weight}$
 $a = \text{acceleration}$

$$\therefore \frac{CD}{2} \rho A l$$

divide by m $\frac{CD \rho}{2m}$

or $\frac{du}{dt} =$

separate u 's and t 's

$du =$

$\int du =$

$$\frac{du}{1 - \frac{CD \rho}{2m} u}$$

simplify: $\frac{CD \rho}{2m} u$

say $E = \int$

$$\therefore \frac{du}{1 - \frac{CD \rho}{2m} u}$$

integrate $\int \frac{du}{1 - \frac{CD \rho}{2m} u}$

Presenter: Caitlin Kenney, P.E.

Education

- BS Industrial Engineering,
Northeastern University
- MS Systems Engineering,
University of Maryland

Licensed & Certified

- Licensed Professional Engineer,
Maryland DLLR, License #42915
- Certified Project Management
Professional (PMP)



Experience

- Navy, Coast Guard, and Army engineering acquisitions
- NCEES ISE Exam Development Committee

YOUR FUTURE



“The best advice I can give to engineering students is to become a P.E. It’s one of the best career decisions you’ll ever make.”

Vicki Willis Ford, P.E., S.E.
Senior Associate and Engineer



Into the great unknown

- Do you know what you'll do when you graduate?
- Where do you see yourself in five years?
- What about 10 years? 20? 30?



KNOWLEDGE &
SKILLS

+ EXPERIENCE

COMPETENCE



It's about showing what you can do

- What do hiring firms look for?
- Degrees, experiences, work references, technical skills
- What if there were a universal standard that is recognized throughout the profession?

“A P.E. license has benefited my career. Being a P.E. proves your experience and competence, which is important in the profession, no matter the discipline.”

Heather Dougherty, P.E.
Federal Research Engineer



Licensure: a universal standard

- “[Engineering] licensure is crucial for career advancement and top pay.” –*U.S. News & World Report*
- Think about other professions:
 - Why do we license physicians?
 - Accountants?
 - Attorneys?

License vs. Certification?

- Only a P.E. license is regulated by the state, ensuring competency and ethical behavior
- Certifications are granted with no government regulatory oversight
- Notable example: ASEP, CSEP, ESEP
 - ↪ Offered by INCOSE
 - ↪ Regulated by the professional organization, not the state
- Notable example: 6Sigma Certification
 - ↪ Offered by: IIE, ASQ, CQI, various universities and company programs
 - ↪ Requirements: **VARY**; participation in course, exam, and/or submission of project
 - ↪ Anyone can apply, including non-engineers



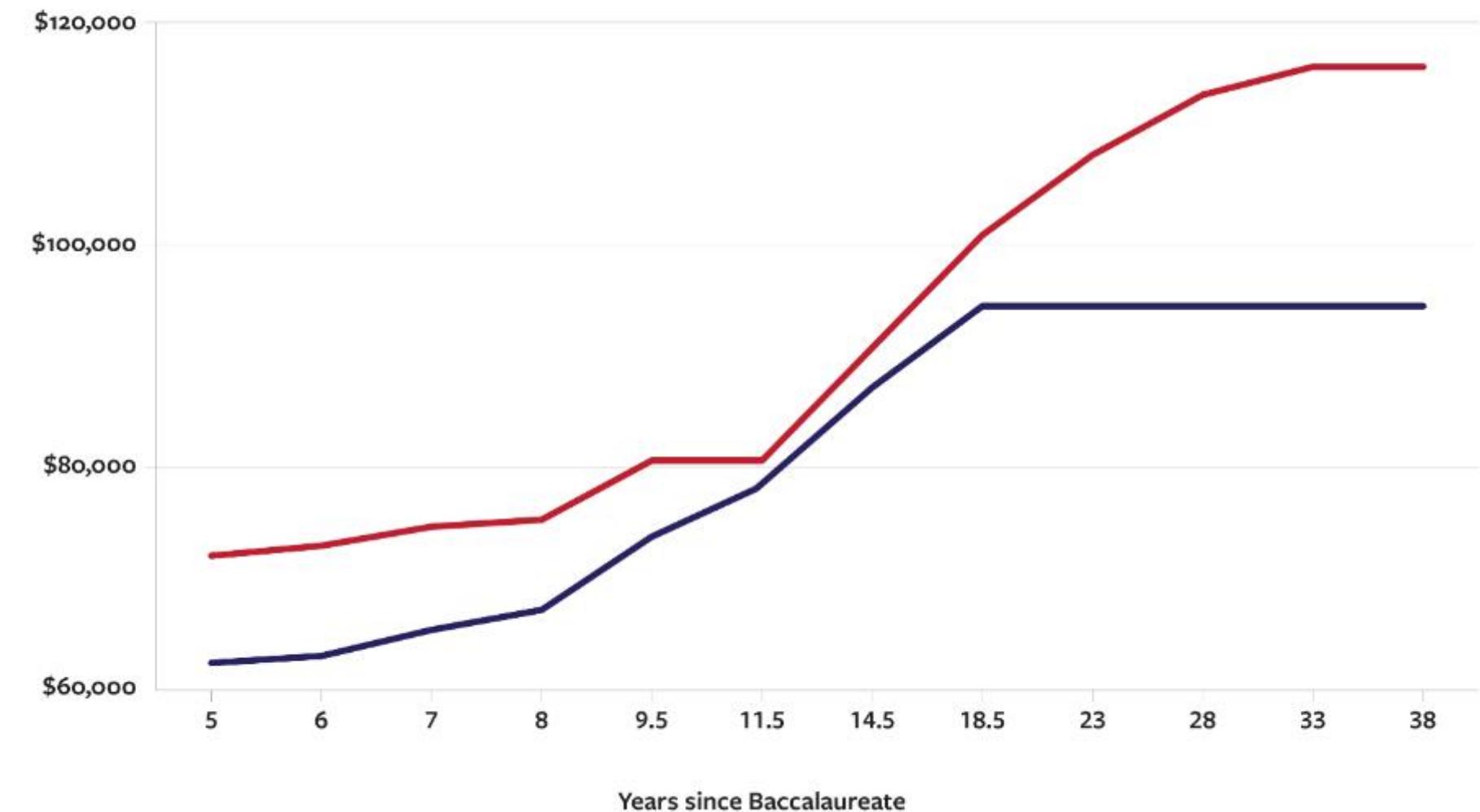
“Quite simply, passing the FE exam and ultimately the PE, gives an individual options that make them highly competitive in a highly competitive field.”

Jason J. Gamble P.E.

Exam Development Engineer

Professional Engineers Earn More

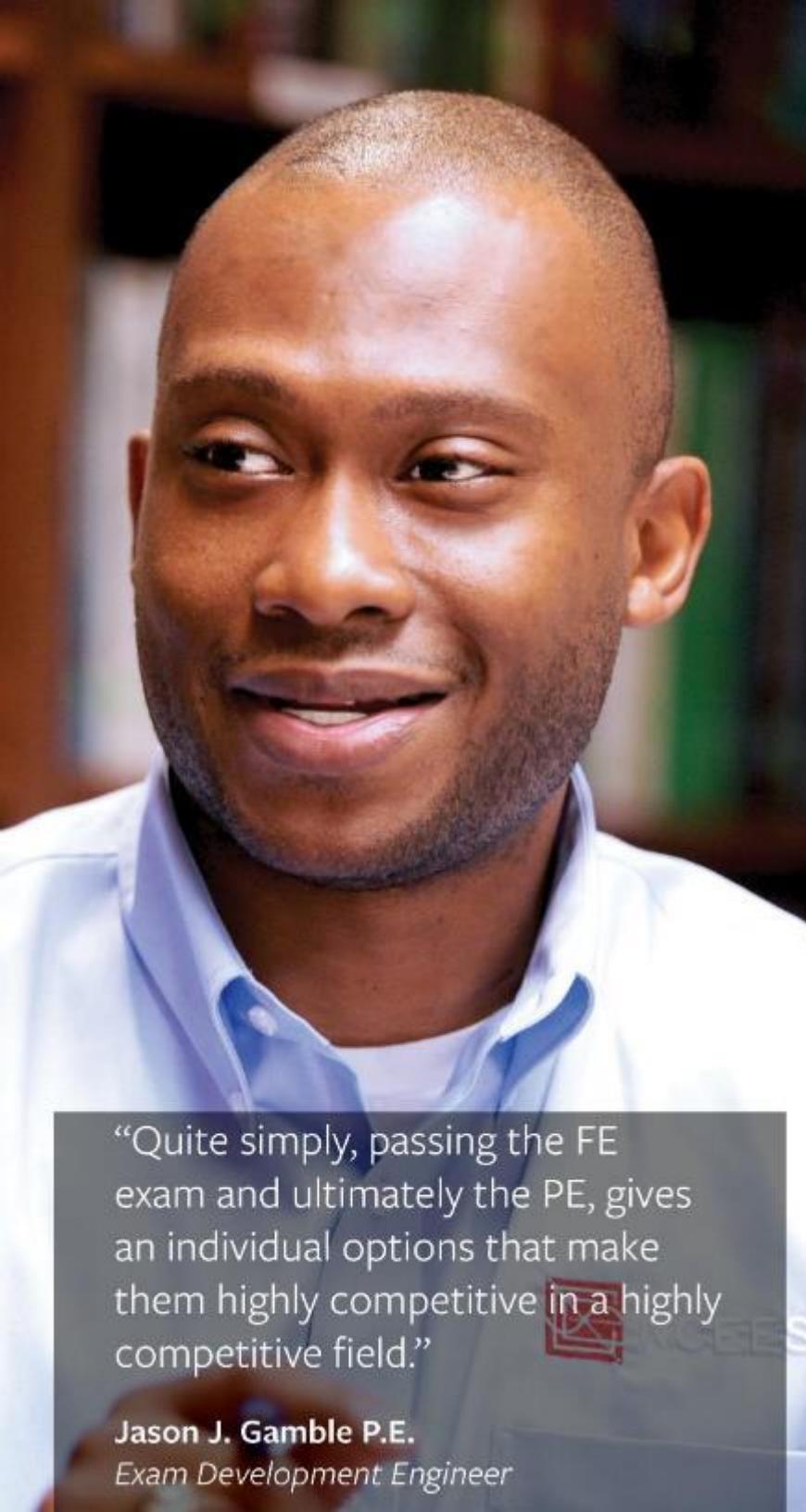
Legend:
Licensed Engineer (P.E.)
Unlicensed Engineer



*Figures based on the most recent ‘Engineering Salary Survey’ by the *American Association of Engineering Societies (AAES)*. Throughout the course of a career, the median salary of a professionally licensed engineer earns a higher salary than an unlicensed engineer. *

The P.E. license

- A professional engineer
 - Has the education, experience, and technical knowledge to lead
 - Has an obligation to safeguard the public
- It works both ways:
 - You stand out in a crowd as a P.E.
 - The public is safeguarded from incompetent or unethical practice.

A close-up portrait of a Black man with short hair, wearing a light blue button-down shirt. He is smiling and looking slightly to the right of the camera. The background is blurred.

The licensing process

- Who oversees licensure?
- Requirements can differ by state (but not too much).
- Comity licensure: obtaining a P.E. license in additional states

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Jason J. Gamble P.E.

Exam Development Engineer



State law and engineering practice

- Only a P.E. can practice engineering.
- What does that include?
 - Owning a firm
 - Consulting
 - Signing/sealing a design
 - Bidding for public money
 - Advertising your services
 - Calling yourself a professional engineer

The benefits of a P.E.

- It opens career doors.
- In a stack of resumes, yours stands out.
- You belong to a licensed profession.
- You serve the public—not just your employer.
- You typically earn more than peers without a P.E.

3

steps

Getting from point A to P.E.





1

Education

- Get an engineering degree from an EAC/ABET accredited program.
 - Bachelor's or master's (or both)
 - The Engineering Accreditation Commission of ABET accredits college engineering programs.
- Some states allow engineering technology degrees (TAC approved ABET degrees)

2

3



- Work under the supervision of a P.E.
 - Or have a PE attest to your work
- Four years, progressive
- Keep track of all experience in a supplemental experience record
 - Use engineering verbs, not administrative verbs
 - Don't focus on titles – focus on the work and how it relates to ISE



- Pass the FE exam in your senior year of college (or shortly after graduation).
- Pass the PE exam in your engineering discipline.

THE FE EXAM



“I would suggest taking the Fundamentals of Engineering exam anywhere from six months before graduation to six months after graduating. This way, the undergraduate college material is still fresh in your mind.”

Clyde Lettsome, Ph.D., P.E.
Software Engineer and Consultant

FE exam format and content

- 7 freestanding discipline-specific exams
 - Chemical, Civil, Computer and Electrical, Environmental, Industrial & Systems, Mechanical, Other Disciplines
- Exam specifications (what's on the exam)
 - Available at ncees.org/exams
- *FE Reference Handbook*
- 110 exam questions
- Standard and alternative item types (AITs)
 - ⇒ Multiple choice (one correct option), Multiple correct options, Point and click, Drag and drop, fill in the blank

FE Industrial and Systems: Exam Specification

- Mathematics 6–9
- Engineering Sciences 5-8
- Ethics and Professional Practice 5-8
- Engineering Economics 10–15
- Probability and Statistics 10-15
- Modeling and Computations 8-12
- Industrial Management 8-12
- Manufacturing, Production, and Service Systems 8-12
- Facilities and Logistics 8-12
- Human Factors, Ergonomics, and Safety 8-12
- Work Design 8-12
- Quality 8-12
- Systems Engineering 8-12

FE exam administration

- Approved Pearson VUE test centers
- Year-round testing
- 6-hour exam appointment, which includes
 - Nondisclosure agreement (2 minutes)
 - Tutorial (8 minutes)
 - Exam (5 hours and 20 minutes)
 - Scheduled break (25 minutes)
 - Brief survey

FE FAQs

- What's the exam day like?
☞ Youtube.com/NCEESmedia
- What references can I bring?
- What do I use for scratch work?
- What's the *NCEES Examinee Guide*?
- Are practice exams available?
- When will I receive my results?

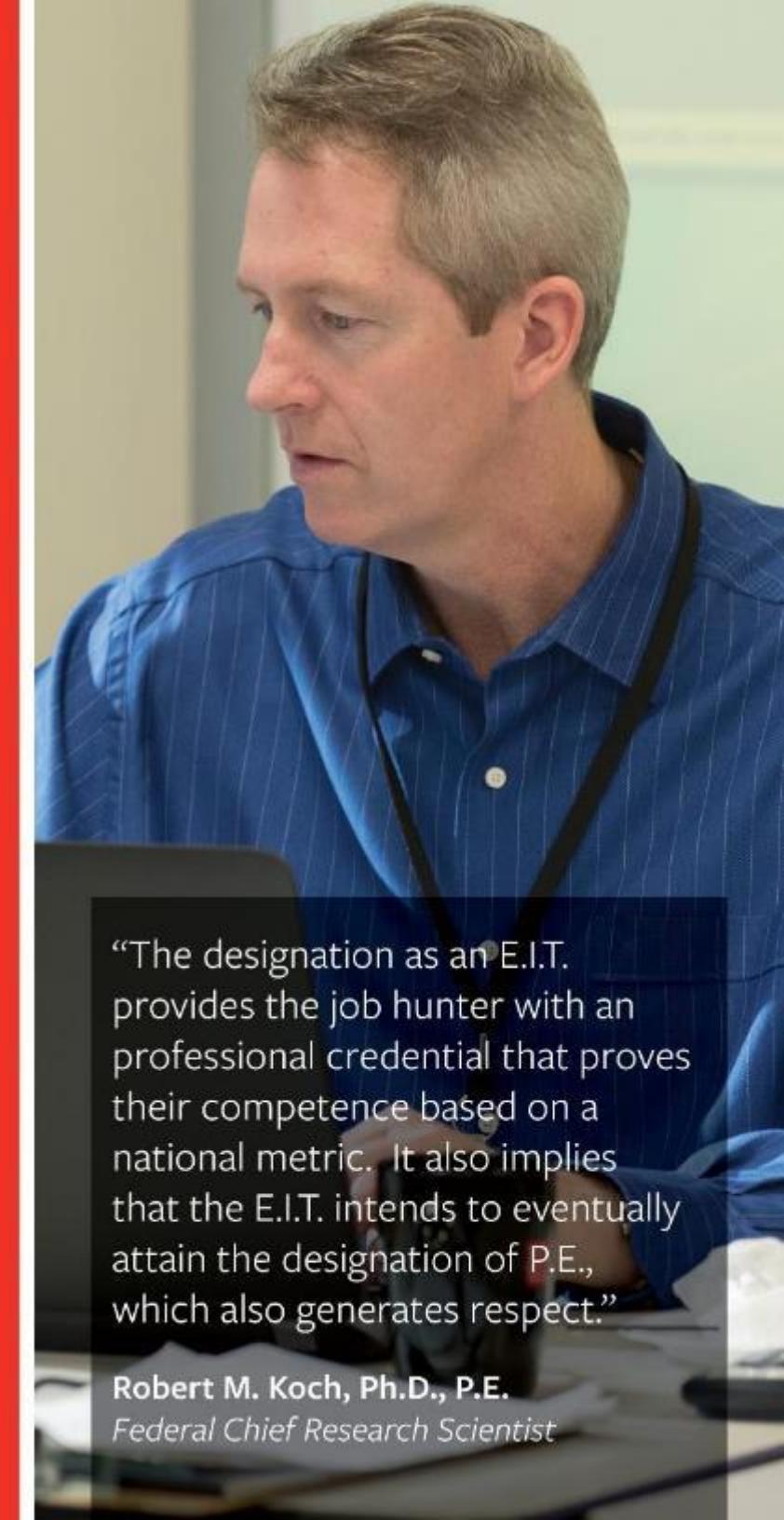
When should I take the FE?



“I would suggest taking the Fundamentals of Engineering exam anywhere from six months before graduation to six months after graduating. This way, the undergraduate college material is still fresh in your mind.”

Clyde Lettsome, Ph.D., P.E.
Software Engineer and Consultant

THE PE EXAM



“The designation as an E.I.T. provides the job hunter with an professional credential that proves their competence based on a national metric. It also implies that the E.I.T. intends to eventually attain the designation of P.E., which also generates respect.”

Robert M. Koch, Ph.D., P.E.
Federal Chief Research Scientist

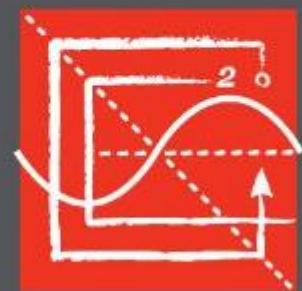
The ISE PE exam

- Reflects real-world practice
- Tests for minimal competency
- Given once a year
 - ↪ Last paper ISE exam will be April 2019
 - ↪ ISE will transition to CBT in October 2020
- Developed by licensed engineers
- Reference materials permitted
 - ↪ Open book for paper exams – can bring own
 - ↪ Reference handbook provided for CBT
- Specifications and exam prep materials available at NCEES.org

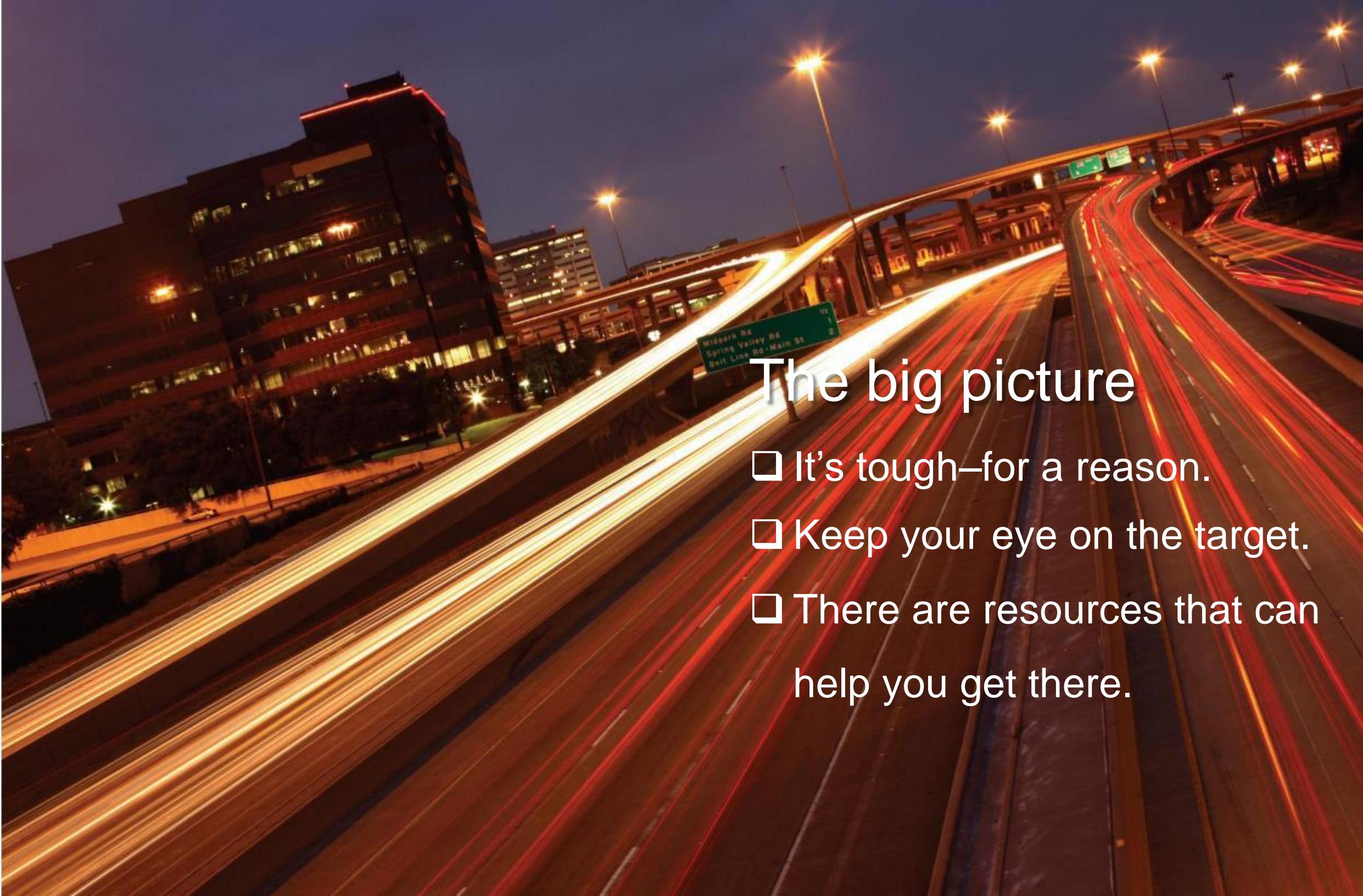
PE Industrial and Systems: Exam Specification

- Systems Definition, Analysis, and Design 16
- Facilities Engineering and Planning 16
- Supply Chain and Logistics 16
- Work Design 16
- Quality Engineering 16
- PE exam specifications are posted 6 months before the exam administration.
- Updates for the April exams are posted in November, and updates for the October exams are posted in May.
- <https://ncees.org/engineering/pe/industrial-systems/>

WHAT'S NEXT?



NCEES



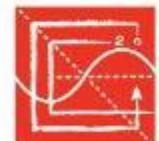
The big picture

- It's tough—for a reason.
- Keep your eye on the target.
- There are resources that can help you get there.

LICENSURE

The next step is yours.

ncees.org



NCEES
*advancing licensure for
engineers and surveyors*