

# **A Structured Approach to CCEA<sup>®</sup> Certification**

## **How to Effectively Prepare For the Exam**

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**Rick Beavers  
Senior Business Operations Manager**



# Preparing For the CCEA® Exam

## One Group's Experience

- **Background:**
  - In early 2010, six Lockheed Martin employees in Chelmsford began preparing to take the exam
  - Experience ranged from just a few years to over twenty years in the Defense industry
- **What Did Not Work:**
  - Casual reading of CEBoK modules
  - One-hour “Lunch & Learn” sessions covering CEBoK modules
  - CEBoK module group study without prior individual study
- **Our Approach:**
  - Creating a CEBoK study plan with weekly objectives
  - Pre-testing & re-testing to assess readiness
  - Using group study to work problems & share knowledge
  - Dedicating the time it takes to learn the materials in all CEBoK modules
- **Results:**
  - Three of the six sat for the exam in 2010 and all three achieved CCEA® status first time (the other three dropped out for unrelated personal reasons)
  - Plan developer won New England Chapter and National Estimator of the Year Awards in 2011
  - New England SCEA Chapter is incorporating lessons learned into their training program

**Proven Results: 100% Pass Rate**

# The Chelmsford LMMFC Approach



- **Plan your work and work your plan**
  - Target a test date from the start
  - Have a week-by-week plan to get there – adjust as necessary
  - Use the CEBoK quizzes to pre-test (all 320 questions) - get an honest assessment (don't guess if you have no idea)
- **Study the CEBoK materials independently**
  - Print & read the materials - highlight and make notes as you study
  - Work the example problems in the modules for yourself
  - Practice solving problems – use a calculator allowed in exam
  - Make sticky-note reminders of important acronyms, formulas & graphs - post them where you will see them daily
- **Use group study time effectively**
  - Come prepared – read, study & work problems before group sessions
  - Work through difficult CEBoK problems in class
  - Allow question-&-answer time with a Subject Matter Expert, to discuss difficult concepts or techniques

**Use Study Time Effectively – Individual & Group**

# The Chelmsford LMMFC Approach



(Continued)

- **Conduct self-tests after every four to six modules**
  - Use CEBoK quiz questions, but avoid memorizing quiz answers
  - Use a spreadsheet to score self-tests, to avoid memorizing answer letters, wording or positions
  - For missed questions, refer back to module pages, rather than just reading quiz solutions, when possible, to force yourself to learn concepts, formulas, terms & techniques
  - Use modified CEBoK quiz questions – make your own problems – have one person make quiz for others
  - Continue studying each module, mastering the concepts in it, until you score 85% or better on every module
- **Share & seek out techniques & information – teaching reinforces learning**
  - How to set up tables & formulas
  - Memorization aids- make up acrostics & other mnemonic devices
  - Problem-solving methods
- **Review intensively during the last two weeks before exam**
  - Use CEBoK module quizzes to assess readiness
  - Re-visit notes on main concepts, acronyms, terms, formulas & graphs from each module
  - Make up your own practice problems and solve them, for the math-intensive modules

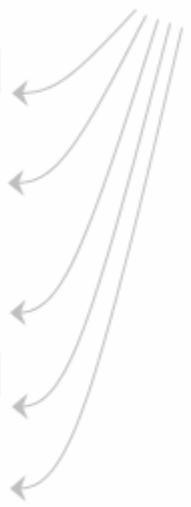
**Use Learning Tools & Resources Effectively**



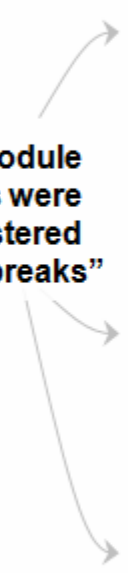
# Study Plan Example

| Week | Material     | Topic                        | Slides/Pgs | Wks Allot | Wk Ending |
|------|--------------|------------------------------|------------|-----------|-----------|
| 1    | Module 1     | Cost Estimating Basics       | 88         | 1         | 5-Mar-10  |
| 2    | Module 2     | Costing Techniques           | 65         | 1         | 12-Mar-10 |
| 3    | Module 3     | Parametrics                  | 43         | 1         | 19-Mar-10 |
| 4    | Module 4     | Data Collection              | 52         | 1         | 26-Mar-10 |
| 5    | Module 5     | Inflation                    | 70         | 1         | 2-Apr-10  |
| 6    | Module 6     | Data Analysis                | 62         | 1         | 9-Apr-10  |
| 7    |              | Review/Catch Up              |            | 1         | 16-Apr-10 |
| 9    | Module 8     | Regression                   | 80         | 2         | 30-Apr-10 |
| 10   | Module 7     | Learning Curves              | 99         | 1         | 7-May-10  |
| 12   | Module 9     | Risk                         | 153        | 2         | 21-May-10 |
| 13   | Module 10    | Probability and Statistics   | 96         | 1         | 28-May-10 |
| 14   | Module 11    | Mfg Cost Estimating          | 75         | 1         | 4-Jun-10  |
| 16   | Module 12    | Software Cost Estimating     | 103        | 2         | 18-Jun-10 |
| 17   |              | Review/Catch Up              |            | 1         | 25-Jun-10 |
| 19   | Module 13    | Economic Analysis            | 143        | 2         | 9-Jul-10  |
| 20   | Module 14    | Contract Pricing             | 67         | 1         | 16-Jul-10 |
| 22   | Module 15    | EVM                          | 138        | 2         | 30-Jul-10 |
| 23   | Module 16    | Cost Management              | 88         | 1         | 6-Aug-10  |
| 24   | Review 1-4   | Module Reviews/Exam Practice |            | 1         | 13-Aug-10 |
| 25   | Review 5-8   | Module Reviews/Exam Practice |            | 1         | 20-Aug-10 |
| 26   | Review 9-12  | Module Reviews/Exam Practice |            | 1         | 27-Aug-10 |
| 27   | Review 13-16 | Module Reviews/Exam Practice |            | 1         | 3-Sep-10  |
|      | Exam         | Sometime before 9/30/10      |            |           |           |

**Notice: Two weeks were allotted to larger modules**



**Multi-module quizzes were administered during "breaks"**

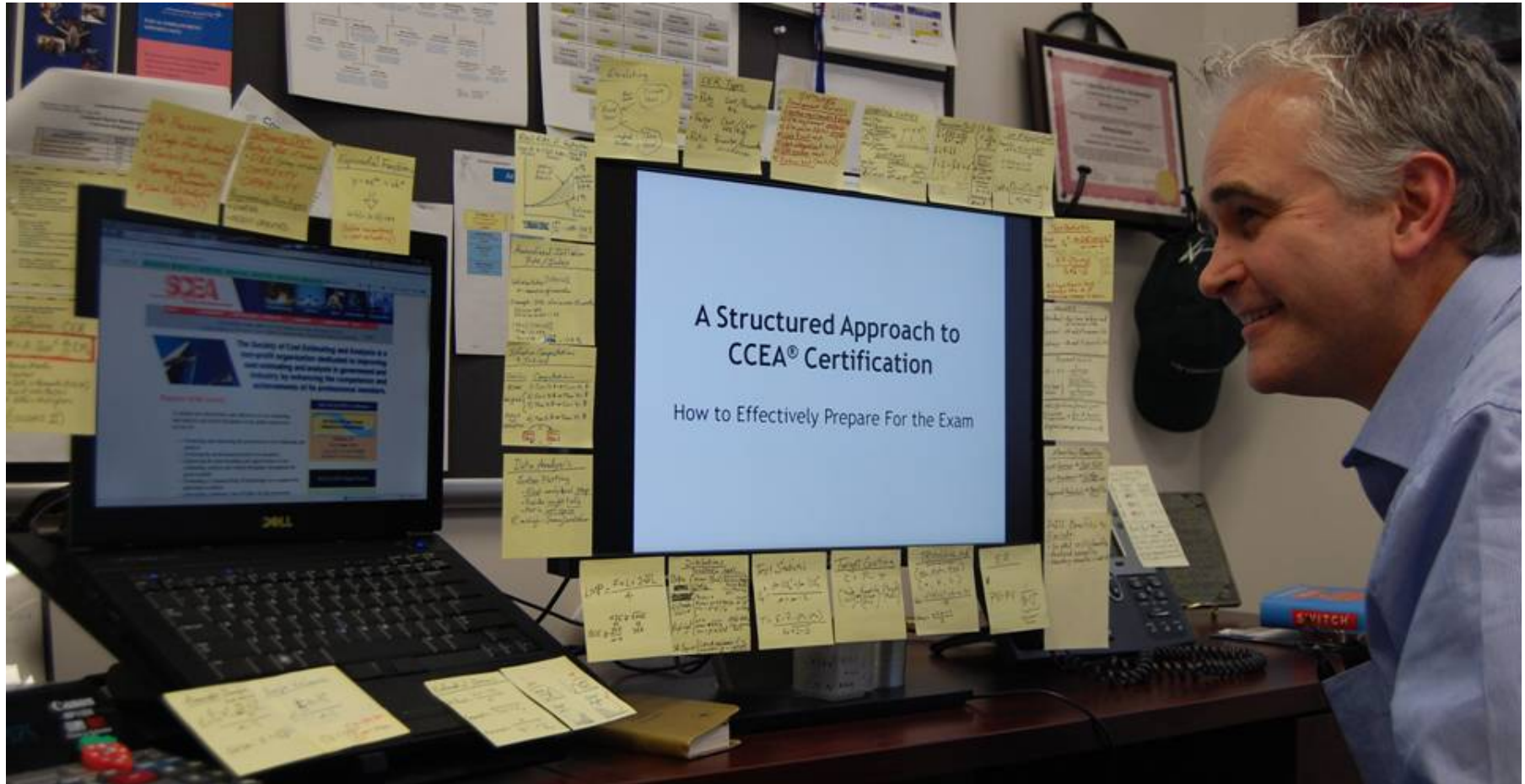


**NOTE: We slipped our exam date to December and adjusted the plan, due to unexpected impacts on our job workloads, but having a plan kept us moving forward, focused on the goal.**

**Plan Your Work and Work Your Plan**



# Sticky Note Example



**Post notes with key formulas, concepts, terms and relationships  
Change them out as you move through the modules**

**Immerse Yourself In the Materials**



# Map & Track Your Areas to Study

- 1) Pre-test on all 16 modules
- 2) List all questions missed in each module
- 3) Identify slides that cover missed questions (see quiz solution sections)
- 4) Study those slides
- 5) Re-test module(s)
- 6) Repeat steps 2-5, until you are confident with the materials

## Example:

After you re-take the quiz, you should have fewer missed questions.

Let them show you where you still need study.

Cross off modules as you master them.

| Mod.         | Questions Missed (Pre-Test)         | SLIDES   |
|--------------|-------------------------------------|--|
| <del>1</del> | <del>5, 11, 15, 18</del>            | <del>17, 21, 22, 60</del>  |
| <del>2</del> | <del>7, 14</del>                    | <del>21, 30</del>  |
| 3 ✓          | 2, 4, 5, 9, 15, 17, 18              | 11, 12, 14, 18, 24, 28   |
| <del>4</del> | <del>6, 9, 10</del>                 | <del>30, 31, 38</del>  |
| <del>5</del> | All but 14                          | 11, 14   |
| 6 ✓          | 1, 7, 9, 11, 13, 15                 | 53, 7, 8, 11, 14, 17, 20, 30, 28, 39                                       |
| 7 ✓          | 1, 4, 6, 9, 17, 19, 20              | 7, 8, 11, 13, 15, 17, 25, 30, 32, 55                                       |
| 8 ✓          | 4-20                                | ALL  |
| 9 ✓          | 5, 6, 9-20                          | 24, 34, 36, 41, 50, 51, 64, 69, 82, 97, 98                                 |
| 10 ✓         | 4, 5, 7, 15, 18, 20                 | ALL  |
| 11 ✓         | 9, 18, 19                           |  |
| 12 ✓         | 3, 7, 15, 16, 18                    |  |
| 13 ✓         | 3, 6, 8, 10, 12, 13, 15, 17, 19, 20 | 77-uniform Annual Cost<br>80, 72, 73 ff. Discount Factor<br>89, 76, 73, 50 |
| 14 ✓         | 4, 7, 10, 12, 15, 17, 19            |  |
| 15 ✓         | 2, 4, 6, 12, 15, 20                 |  |
| 16 ✓         | 1-7, 9, 11, 14, 17, 20              | 19, 20   |

You may see a pattern, pointing to a few slides, in some modules...

Or you may see that you really just need to study the whole module.

Sometimes just one key definition, formula or concept can dramatically improve your score.

## Track Your Progress



# Some Helpful Tips

- **For Studying:**
  - **Learn your calculator functions**
  - **Memorize key formulas**
  - **Develop standard set-ups (table formats)**
    - Cum Ave Unit Cost & Unit Learning Curve
    - Sample Variance & Coefficient of Variance
    - Earned Value Variances & Indices
  - **Practice solving the problems**
    - Work out the CEBok module problems & quizzes for yourself
    - Make up your own problems, then solve them
    - If you have a study buddy, make up problems for each other
  - **Keep your knowledge fresh by re-testing periodically**
- **For the Exam:**
  - **Use your standard set-up methods and formulas to get started in the right direction**
  - **If you can narrow choices to two of four, go ahead and guess**
  - **Manage your time wisely**
    - Don't get bogged down; move on and come back if time permits
    - Don't spend an inordinate amount of time on a complex case question that is equal in points to multiple choice questions

**Learn From the Experience of Others**





# Quiz-Scoring Worksheet Example

**“Answer Key” Tab:**  
Individual Answers Are Entered Into Columns

| A  | B      | C        | D          | E        | F        | G        | H        | I          | J |
|----|--------|----------|------------|----------|----------|----------|----------|------------|---|
| 1  | Name:  |          | Mike       | Rick     | Andrea   | Ken      | Ryan     | Marlangela |   |
| 2  | Date:  |          | 03/01/10   | 03/02/10 | 03/02/10 | 03/03/10 | 03/17/10 | 03/17/10   |   |
| 3  | Module | Question | Answer Key | Answers  | Answers  | Answers  | Answers  |            |   |
| 4  | 1      | 1        | B          | B        | B        | B        | C        |            |   |
| 5  | 2      | 2        | A          | A        | A        | A        | B        |            |   |
| 6  | 3      | 3        | D          | D        | D        | D        | D        |            |   |
| 7  | 4      | 4        | B          | B        | B        | B        | A        |            |   |
| 8  | 5      | 5        | B          | A        | D        | B        | B        |            |   |
| 9  | 6      | 6        | B          | B        | B        | B        | B        |            |   |
| 10 | 7      | 7        | A          | A        | A        | A        | B        |            |   |
| 11 | 8      | 8        | G          | G        | G        | E        | B        |            |   |
| 12 | 9      | 9        | B          | B        | A        | A        | B        |            |   |
| 13 | 10     | 10       | F          | F        | F        | F        | F        |            |   |
| 14 | 11     | 11       | A          | A        | A        | A        | B        |            |   |
| 15 | 12     | 12       | D          | C        | C        | C        | C        |            |   |
| 16 | 13     | 13       |            |          |          |          | A        |            |   |
| 17 | 14     | 14       |            |          |          |          | C        |            |   |
| 18 | 15     | 15       |            |          |          |          | F        |            |   |
| 19 | 16     | 16       |            |          |          |          | B        |            |   |
| 20 | 17     | 17       |            |          |          |          | C        |            |   |
| 21 | 18     | 18       |            |          |          |          | A        |            |   |
| 22 | 19     | 19       |            |          |          |          | C        |            |   |
| 23 | 20     | 20       |            |          |          |          | B        |            |   |
| 24 | 1      | 1        |            |          |          |          | C        |            |   |
| 25 | 2      | 2        |            |          |          |          | B        |            |   |
| 26 | 3      | 3        |            |          |          |          | A        |            |   |
| 27 | 4      | 4        |            |          |          |          | B        |            |   |
| 28 | 5      | 5        |            |          |          |          | C        |            |   |
| 29 | 6      | 6        |            |          |          |          | D        |            |   |
| 30 | 7      | 7        |            |          |          |          | G        |            |   |
| 31 | 8      | 8        |            |          |          |          | D        |            |   |
| 32 | 9      | 9        |            |          |          |          | A        |            |   |
| 33 | 10     | 10       |            |          |          |          | B        |            |   |
| 34 | 11     | 11       |            |          |          |          | B        |            |   |
| 35 | 12     | 12       |            |          |          |          | C        |            |   |
| 36 | 13     | 13       |            |          |          |          | D        |            |   |
| 37 | 14     | 14       |            |          |          |          | B        |            |   |

Correct answers are hidden in “Answer Key” column, in blue text, on blue background .  
Spreadsheet formula uses them to score tests.

**“Score Summary” Tab:**  
Spreadsheet Automatically Scores  
1 for Correct Answer and 0 For Incorrect

| A   | B                            | C        | D       | E    | F    | G      | H   | I    | J          |
|-----|------------------------------|----------|---------|------|------|--------|-----|------|------------|
| 1   | Module                       | Question | Correct | Mike | Rick | Andrea | Ken | Ryan | Marlangela |
| 2   | 1                            | 1        | 1       | 1    | 1    | 1      | 0   | 1    | 1          |
| 3   | 2                            | 2        | 1       | 1    | 1    | 1      | 0   | 1    | 0          |
| 4   | 3                            | 3        | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 5   | 4                            | 4        | 1       | 0    | 0    | 1      | 0   | 1    | 1          |
| 6   | 5                            | 5        | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 7   | 6                            | 6        | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 8   | 7                            | 7        | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 9   | 8                            | 8        | 0       | 0    | 0    | 0      | 0   | 0    | 0          |
| 10  | 9                            | 9        | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 11  | 10                           | 10       | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 12  | 11                           | 11       | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 13  | 12                           | 12       | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 14  | 13                           | 13       | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 15  | 14                           | 14       | 1       | 1    | 1    | 1      | 1   | 1    | 1          |
| 16  | 15                           | 15       | 0       | 0    | 0    | 0      | 0   | 0    | 0          |
| 17  | 16                           | 16       | 0       | 0    | 0    | 0      | 0   | 0    | 0          |
| 18  | 17                           | 17       | 0       | 0    | 0    | 0      | 0   | 0    | 0          |
| 19  | 18                           | 18       | 0       | 0    | 0    | 0      | 0   | 0    | 0          |
| 20  | 19                           | 19       | 0       | 0    | 0    | 0      | 0   | 0    | 0          |
| 21  | 20                           | 20       | 0       | 0    | 0    | 0      | 0   | 0    | 0          |
| 22  | Percent Correct              | 48%      | 55%     | 49%  | 47%  | 42%    | 50% | 47%  |            |
| 328 | 1 Cost Estimating Basics     | 74%      | 90%     | 75%  | 80%  | 50%    | 75% | 75%  |            |
| 329 | 2 Costing Techniques         | 79%      | 90%     | 90%  | 75%  | 70%    | 70% | 80%  |            |
| 330 | 3 Parametrics                | 56%      | 70%     | 65%  |      |        |     |      |            |
| 331 | 4 Data Collection            | 73%      | 70%     | 80%  |      |        |     |      |            |
| 332 | 5 Inflation                  | 38%      | 55%     | 5%   |      |        |     |      |            |
| 333 | 6 Data Analysis              | 49%      | 55%     | 40%  |      |        |     |      |            |
| 334 | 7 Learning Curve             | 22%      | 40%     | 20%  |      |        |     |      |            |
| 335 | 8 Regression                 | 16%      | 25%     | 15%  |      |        |     |      |            |
| 336 | 9 Risk                       | 23%      | 10%     | 30%  |      |        |     |      |            |
| 337 | 10 Probability & Statistics  | 32%      | 20%     | 30%  |      |        |     |      |            |
| 338 | 11 Manufacturing Cost Estima | 81%      | 80%     | 85%  |      |        |     |      |            |
| 339 | 12 Software Cost Estimating  | 46%      | 55%     | 75%  |      |        |     |      |            |
| 340 | 13 Economic Analysis         | 26%      | 30%     | 30%  |      |        |     |      |            |
| 341 | 14 Contracting               | 58%      | 70%     | 55%  |      |        |     |      |            |
| 342 | 15 EVM                       | 63%      | 65%     | 65%  | 65%  | 80%    | 50% | 55%  |            |
| 343 | 16 Cost Management           | 60%      | 30%     | 35%  | 35%  | 35%    | 20% | 20%  |            |
| 344 | Percent Correct              | 48%      | 55%     | 49%  | 47%  | 42%    | 50% | 47%  |            |

Spreadsheet calculates average score for each question

Individuals use results to direct them back to specific pages to study in CEBok modules

Spreadsheet calculates individual & average scores for each module & total.

Conditional formatting highlights strengths in green & development needs in red.

This is actual baseline data for the Chelmsford group.

Don't be discouraged by your initial scores – three of us are now CCEAs.

**If We Can Do It, So Can You!**



# Questions?

**Contact Info:**

**Richard (Rick) Beavers**

Senior Business Operations Manager

**Lockheed Martin Missiles and Fire Control**

16 maple Road Chelmsford, MA 01824

Telephone: 978-703-2645

E-mail: [richard.r.beavers@lmco.com](mailto:richard.r.beavers@lmco.com)

