### CMC Logo Image

### Engineering Competency Model

### PowerPoint Presentation Guide

SCRIPT Overview

The following presentation provides sample slides and talking points for individuals to use as a guide when presenting the Engineering Competency Model to a variety of audiences. **This slideshow and corresponding talking points are comprehensive and should be used as a guide. Presenters should tailor the presentation to meet time restrictions and the needs of their specific audiences**. The talking points included throughout are intended to provide the speaker with multiple options/suggestions for how to communicate the information presented according to their preferences, goals, and intended audience.

***Objectives***

* Build awareness for the work that engineers do and their impact on society.
* Encourage current and prospective engineering students to build the industry’s pipeline of qualitied professionals.
* Communicate the essential skills/abilities for engineers to possess to succeed and advance in the profession.
* Promote additional ways educators, associations and other influential audiences can share/promote or build on the Engineering Competency Model.

***Target Audiences***

* Introductory Presentation:
  + Current and prospective engineering students
  + General audiences
* Advanced Presentation:
  + High school teachers and guidance counselors
  + Engineering professors and faculty
  + Engineering mentors, advocates, and champions
  + Engineering association staff/members
  + Other advanced audiences

***Resource Tools***

* If someone has questions about the Engineering Competency Model, please refer him/her to the Competency Model Clearinghouse webpage, [www.careeronestop.org/CMC/engineering](https://www.careeronestop.org/CMC/engineering).

SLIDE OVERVIEW: STUDENT/INTRODUCTORY AUDIENCES (High-level, 5 – 10 minutes))

Slide 3: Title Slide

* Goals:
  + Set the stage for the presentation
* Notes/Talking Points
  + Presenter to customize with names, dates, locations, etc.
  + If someone has questions about the Engineering Competency Model, please refer him/her to the Competency Model Clearinghouse webpage, [www.careeronestop.org/CMC/engineering](https://www.careeronestop.org/CMC/engineering).

Slide 4: Hook – “Impact of Engineering”

* Goals:
  + Provide background context about who engineers are and what they do
* Notes/Talking Points
  + Engineers solve the world’s fundamental and most complex challenges – serving as the driving force in inventing, designing, building, improving, and sustaining the systems and structures we rely on.
  + The impact of engineers’ work is global: building our infrastructure to get us where we need to go, designing our energy systems to power our lives, and connecting the world’s networks to increase our productivity.
  + Thanks to the work of engineers, our roads and bridges are safer, our cars are more dependable, our food supply is safer and we are more globally connected than ever before.

Slide 5: Hook – “Increasing Demand for Engineers”

* Goals:
  + Present the content of the model and goals of the presentation at a high-level
  + Provide a hook that can then transition into the background of the making of the model (for more formal audiences) or the content of the model (shorter presentation for student audiences)
* Notes/Talking Points
  + The engineering field is growing, and the nation needs more engineers to harness their capabilities to build and sustain a better world.
  + According to projections from the U.S. Bureau of Labor Statistics, the engineering field will grow by 8.3% between 2016 and 2026, resulting in over 139,000 job openings due to growth and net replacements during that period.[[1]](#footnote-1)
  + Representatives from engineering societies and associations and the U.S. Department of Labor (DOL) developed an Engineering Competency Model to serve as a guide for the development of the engineering workforce to help America meet this demand.

Slide 6: Meeting the Demand

* Goals:
  + Introduce the model
* Notes/Talking Points
  + Now is the time to develop the engineer of the future: an individual ready and able to rise to the challenge of meeting this industry demand.
  + To accomplish this goal, the U.S. Department of Labor, Employment and Training Administration (ETA) and engineering subject matter experts from industry and education developed the **Engineering Competency Model**.
  + The model defines the skills required for current and aspiring engineers to advance and succeed.
  + Similar to the systems they build, engineers themselves have essential elements, or competencies, that are important to the performance of a dynamic and adaptable professional.

Slide 7: Engineering Competency Model - Overview

* Goals:
  + Show the full model and express its purpose/value
* Notes/Talking Points
  + Here is a general depiction of a competency model. It has a pyramid-like shape with different tiers. Each tier is made up of various competencies.
  + A competency is the capability to apply a set of related knowledge, skills, and abilities (KSAs) to successfully perform work tasks in an industry or field.
  + The model is designed to establish a more consistent guideline for the profession, uniting the engineering industry around common competencies that are essential for success.
  + The model is intended for use by industry leaders, employers, human resource professionals*,* educators, workforce professionals and career counselors, as well as current and future engineers

**Background for Presenter:** The model is intended for use by:

* + - Industry leaders, employers and human resource professionals, to identify skill needs and assess competencies and performance
    - Educators/academics, to inform the development of competency-based curricula and training
    - Workforce professionals and career counselors, to develop resources for career exploration and guidance
    - Current and future engineers, to gain a clear understanding of the skills and abilities necessary to enter, advance and succeed in the industry

Slide 8: Engineering Competency Model – Details (Slide can be removed to ensure the presentation is under 10 minutes)

* Goals:
  + Illustrate a competency and the value/depth of the information the model presents
* Notes/Talking Points
  + Here is a detailed image of the Engineering Competency Model.
  + The Engineering Competency Model is a four-tier model. The tiers encompass the personal, academic, workplace and technical competencies that are common to the engineering profession, no matter whether you are engaged in mechanical, electrical, civil, or any other discipline of engineering.
  + A fifth tier can be added to identify discipline-specific competencies. This has not been completed for the Engineering Competency Model.
  + Tier 6, a final optional tier, is divided into two areas: competencies needed for management and for occupation-specific requirements for a particular position within the engineering profession.
  + The graphic shown here lists the different competencies within each tier. For example, interpersonal skills is shown as a personal effectiveness competency.

Slide 9: Engineering Competency Model – Details (Slide can be removed to ensure the presentation is under 10 minutes)

* Goals:
  + Illustrate a competency and the value/depth of the information the model presents
* Notes/Talking Points
  + The online model has more detailed explanations of each of those competencies. For example, the details behind the interpersonal skills competency are shown on this slide. I encourage you to go online to view these:

[www.careeronestop.org/CMC/engineering](https://www.careeronestop.org/CMC/engineering)

Slide 10: Core Competencies: Personal Effectiveness and Academic Competencies

* Goals:
  + Present the first two tiers of the model
* Notes/Talking Points
  + The base of the model consists of Tiers 1-3, which represent the non-technical and work readiness skills that most employers demand.
  + Tiers 1 and 2 are shown here. Tier 1 encompasses personal effectiveness competencies and Tier 2 contains academic competencies.
  + First and foremost, effective engineers are effective people. Personal effectiveness competencies such as Interpersonal Skills, Integrity, Professionalism, Initiative, Adaptability and Flexibility, Dependability and Reliability, and an interest in Lifelong Learning are essential qualities engineers need to advance and succeed professionally.
  + Next is Tier 2 – Academic Competencies. Academically, engineers must be highly competent in the areas of math and science and technology, and possess computer and critical and analytical thinking skills. Reading, writing, and communication skills are necessary as well.
  + By combining these skills, engineers are equipped to think critically about the systems problems they need to solve, and then convey these ideas to varying audiences through numerous technology platforms.

Slide 11: Workplace Competencies: Tier 3

* Goals:
  + Present the third tier of the model
* Notes/Talking Points
  + Once engineers have demonstrated themselves to be competent and effective personally and academically, they must then apply these skills professionally in the workplace using competencies that are included in Tier 3. Engineers are team players that employ business fundamentals with internal collaborators and external clients and stakeholders.
  + Engineers approach on-the-job challenges with solutions – working with tools and technology, and leveraging project management skills and keen attention to detail to achieve a project’s desired results.
  + In the workplace, effective engineers leverage their planning and organizational skills and creative thinking ability to approach challenges with solutions.

Slide 12: Technical Competencies: Tier 4

* Goals:
  + Present the fourth tier of the model
* Notes/Talking Points
  + Tier 4 highlights essential industry-wide competencies.
  + From the office to the field, engineers’ technical competencies are key. Engineers practice the foundations of engineering – overlaying industry-wide knowledge with discipline-specific expertise, while maintaining a continual focus on the pillars of engineering design, quality, sustainability, security, and professional ethics. Manufacturing and construction; operations and maintenance; business, legal and public policy; engineering economics; and quality control and assurance are additional vital industry-wide competencies.
  + As mentioned earlier, we consider this a "Tier 4" model, which means that it addresses industry-wide requirements that are common to all sectors of engineering. It does not go into the requirements unique to specific branches of engineering which is why there is no Tier 5 at this time.

Slide 13: Engineering Outcomes

* Goals:
  + Relate the model to students’ application of it in pursuing the engineering profession
* Notes/Talking Points
  + How can we meet the demand for more engineers? By inspiring people – smart, effective people – that want to work in a profession where they are empowered to solve the world’s challenges using a unique set of personal, academic, and technical skills.
  + When engineers apply these fundamental skills in their daily work, they design, improve, and sustain the systems and structures we rely on. As a result, our roads and bridges are safer, our cars are more dependable, our food and water supplies are healthier, and we are more globally connected than ever before.
  + By leveraging this integrated system of core engineering competencies, we are building high caliber engineers of the future that will equip the industry to amplify its growing impact.
  + Become an engineer, and you too can help to solve the world’s problems competently and with confidence.

Slide 14: Call to Action

* Goals:
  + Create a call to action to learn more and further engage with the model
* Notes/Talking Points
  + Do you have what it takes to engineer our future? Visit the Competency Model Clearinghouse at [www.careeronestop.org/CMC/engineering](https://www.careeronestop.org/CMC/engineering) to learn more about the Engineering Competency Model and access additional resources related to the model.
  + This presentation and the development of the model was made possible through a grant by the United Engineering Foundation.

SLIDE OVERVIEW: ADVANCED AUDIENCES (MORE DETAIL ON DEVELOPMENT, 10 – 30 minutes)

Slide 16: Title Slide

* Goals:
  + Set the stage for the presentation
* Notes/Talking Points
  + Presenter to customize with names, dates, locations, etc.
  + If someone has questions about the Engineering Competency Model, please refer him/her to the Competency Model Clearinghouse webpage, [www.careeronestop.org/CMC/engineering](https://www.careeronestop.org/CMC/engineering).

Slide 17: Hook – “Impact of Engineering”

* Goals:
  + Provide background context about who engineers are and what they do
* Notes/Talking Points
  + Engineers solve the world’s fundamental and most complex challenges – serving as the driving force in inventing, designing, building, improving, and sustaining the systems and structures we rely on.
  + The impact of engineers’ work is global: building our infrastructure to get us where we need to go, designing our energy systems to power our lives, and connecting the world’s networks to increase our productivity.
  + Thanks to the work of engineers, our roads and bridges are safer, our cars are more dependable, our food supply is safer and we are more globally connected than ever before.

Slide 18: Hook – “Increasing Demand for Engineers”

* Goals:
  + Present the content of the model and goals of the presentation at a high-level
  + Provide a hook that can then transition into the background of the making of the model (for more formal audiences) or the content of the model (shorter presentation for student audiences)
* Notes/Talking Points
  + The engineering field is growing, and the nation needs more engineers to harness their capabilities to build and sustain a better world.
  + According to projections from the U.S. Bureau of Labor Statistics, the engineering field will grow by 8.3% between 2016 and 2026, resulting in over 139,000 job openings due to growth and net replacements during that period.[[2]](#footnote-2)
  + Representatives from engineering societies and associations and the U.S. Department of Labor (DOL) developed an Engineering Competency Model to serve as a guide for the development of the engineering workforce to help America meet this demand.

Slide 19: Model Introduction – Meeting the Demand

* Goals:
  + Introduce the model
* Notes/Talking Points
  + Now is the time to develop the engineer of the future: an individual ready and able to rise to the challenge of meeting this industry demand.
  + To accomplish this goal, the U.S. Department of Labor, Employment and Training Administration (ETA) and engineering subject matter experts from industry and education developed the **Engineering Competency Model**.
  + The model defines the skills required for current and aspiring engineers to advance and succeed.
  + Similar to the systems they build, engineers themselves have essential elements, or competencies, that are important to the performance of a dynamic and adaptable professional.

Slide 20: Industry Competency Model Initiative: U.S. Department of Labor Employment and Training Administration

* Goals:
  + Explain the Industry Competency Model Initiative
* Notes/Talking Points
  + The Industry Competency Model Initiative is part of Employment and Training Administration’s (ETA) effort to create a dynamic, well-trained, competitive workforce. As part of the initiative, ETA works collaboratively with other federal agencies, industry associations, community colleges, and other subject matter experts to develop and maintain competency models for economically vital industries and sectors of the American economy.

Slide 21: Partners in the Engineering Community

* Goals:
  + Introduce the participants from the engineering community in the development of the model
* Notes/Talking Points
  + Before we get into specific aspects of the model, I’d like to provide some background on the organizations that were involved in the development of the model.
  + As mentioned earlier, the development if the Engineering Competency Model was a joint effort between the U.S. Department of Labor and industry and academic experts. Presented on this slide are the engineering and engineering-related professional societies that were involved in this effort.

Slide 22: Competency Model as a Roadmap

* Goals:
  + Explain the background behind competency models as a framework/roadmap
* Notes/Talking Points
  + How are we defining competencies? And what do we mean by “competency models”? As you can see on the slide, we have some formal definitions. A competency is the ability to apply knowledge, skills, and abilities – KSAs – to perform work tasks in an industry or field. For example, if someone possesses a “Critical and Analytical Thinking” competency, he or she is able to use logic, reasoning, and analysis to address problems.
  + ETA’s competency models are a convenient way to organize and communicate the competencies needed in a specific industry or profession.

Slide 23: Competency Model as a Resource

* Goals:
  + Explain the background behind competency models as a framework/roadmap
* Notes/Talking Points
  + Why do we produce competency models? How can they be used to develop a strong workforce?
  + The national industry and professional models are primarily a resource or tool for developing more specific end products. For example, competency models can be used to identify specific employer skill needs; develop competency-based curricula and training modules; develop industry-defined performance indicators, skills standards, and certifications; and help individuals explore careers.
  + Because of the many applications of competency models, there are a number of people who may find them useful, including employers and industry leaders, human resource professionals, educators, economic developers, public workforce professionals, students, and associations.

Slide 24: Application of a Competency Model

* Goals:
  + Illustrate a practical application of the model
* Notes/Talking Points
  + As an example of a practical application of the model, we’ll explore the Geospatial Competency Model. Geospatial educators across the country were developing and updating curriculum. DOL worked with the GeoTech Center (funded in part by the National Science Foundation) and other subject matter experts to develop a geospatial competency model. The educators then put all of the elements of the model into a spreadsheet, put their courses across the top, and placed checks in the boxes to indicate which competencies were covered in which courses. As a result of this exercise they discovered that there were some competencies that they themselves had identified as essential but that were not covered in any of the courses! There were also competencies covered in multiple courses—which can be fine—but that needed to be examined carefully to make sure an advanced course is building on knowledge in foundational courses and adding to that, rather than repeating it.
  + As a result of this work, the Competency Model Clearinghouse site now has downloadable worksheets for curriculum development and similar purposes. Every model posted on the site has these resources available.

Slide 25: Developing the Engineering Competency Model

* Goals:
  + Illustrate the process employed to develop the model
* Notes/Talking Points
  + To begin development of the model, the U.S. Department of Labor’s Employment and Training Administration assigned a dedicated research team to oversee the project, and industry organizations provided individuals to serve on a working group. The working group members supplied a vast number of sources of competency information to review, including ABET accreditation criteria, bodies of knowledge from various engineering societies, the Project Lead the Way outline, and curricula and related resources from academic institutions around the country.
  + The working group also identified subject matter experts from engineering societies representing industry and academia to assist the research team in developing and critiquing the draft model.
  + Throughout the development of the Engineering Competency Model, the working group sought to gather feedback and input from stakeholders across the engineering community, from educators of future engineers to those who employ engineers. A webinar was held to explain the development process, discuss how the model could be a useful tool for engineering-related societies in the future, and get feedback on the preliminary draft.
  + The working group also distributed a survey to solicit feedback from the engineering community and gathered input from over 100 engineering leaders. The survey data, analyzed by the DOL team, was considered when updating and revising the model and was part of the agenda for the model validation meeting.
  + With the assistance of the DOL team, the working group held a model validation meeting with the participating subject matter experts and representatives from other engineering community organizations to gather additional insight and finalize the Engineering Competency Model.
  + After the final revisions were made, the Engineering Competency Model was endorsed by engineering working group and launched on the DOL’s Competency Model Clearinghouse.

Slide 26: Value of the Engineering Competency Model

* Goals:
  + Illustrate the value/impact of the model
* Notes/Talking Points
  + The model is designed to establish a more consistent guideline for the profession, uniting the engineering industry around common competencies that are essential for success.
  + The model is intended for use by:
    - Industry leaders, employers and human resource professionals, to identify skill needs and assess competencies and performance
    - Educators/academics, to inform the development of competency-based curricula and training
    - Workforce professionals and career counselors, to develop resources for career exploration and guidance
    - Current and future engineers, to gain a clear understanding of the skills and abilities necessary to enter, advance and succeed in the industry

Slide 27: Engineering Competency Model - Overview

* Goals:
  + Show the full model and express its purpose/value
* Notes/Talking Points
  + Here is a general depiction of a competency model. It has a pyramid-like shape with different tiers. Each tier is made up of various competencies.
  + A competency is the capability to apply a set of related knowledge, skills, and abilities (KSAs) to successfully perform work tasks in an industry or field.
  + The model is designed to establish a more consistent guideline for the profession, uniting the engineering industry around common competencies that are essential for success.
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**Background for Presenter:** The model is intended for use by:

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    - Educators/academics, to inform the development of competency-based curricula and training
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    - Current and future engineers, to gain a clear understanding of the skills and abilities necessary to enter, advance and succeed in the industry.

Slide 28: Engineering Competency Model – Details

* Goals:
  + Illustrate a competency and the value/depth of the information the model presents
* Notes/Talking Points
  + Here is a detailed image of the Engineering Competency Model.
  + The Engineering Competency Model is a four-tier model. The tiers encompass the personal, academic, workplace and technical competencies that are common to the engineering profession, no matter whether you are engaged in mechanical, electrical, civil, or any other discipline of engineering.
  + A fifth tier can be added to identify discipline-specific competencies. This has not been completed for the Engineering Competency Model.
  + Tier 6, a final optional tier, is divided into two areas: competencies needed for management and for occupation-specific requirements for a particular position within the engineering profession.
  + The graphic shown here lists the different competencies within each tier. For example, interpersonal skills is shown as a personal effectiveness competency.

Slide 29: Engineering Competency Model – Details

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[www.careeronestop.org/CMC/engineering](https://www.careeronestop.org/CMC/engineering)

Slide 30: Core Competencies: Personal Effectiveness and Academic Competencies

* Goals:
  + Present the first two tiers of the model
* Notes/Talking Points
  + The base of the model consists of Tiers 1-3, which represent the non-technical and work readiness skills that most employers demand.
  + Tiers 1 and 2 are shown here. Tier 1 encompasses personal effectiveness competencies and Tier 2 contains academic competencies.
  + First and foremost, effective engineers are effective people. Personal effectiveness competencies such as Interpersonal Skills, Integrity, Professionalism, Initiative, Adaptability and Flexibility, Dependability and Reliability, and an interest in Lifelong Learning are essential qualities engineers need to advance and succeed professionally.
  + Next is Tier 2 – Academic Competencies. Academically, engineers must be highly competent in the areas of math and science and technology, and possess computer and critical and analytical thinking skills. Reading, writing, and communication skills are necessary as well.
  + By combining these skills, engineers are equipped to think critically about the systems problems they need to solve, and then convey these ideas to varying audiences through numerous technology platforms.

Slide 31: Workplace Competencies: Tier 3

* Goals:
  + Present the third tier of the model
* Notes/Talking Points
  + Once engineers have demonstrated themselves to be competent and effective personally and academically, they must then apply these skills professionally in the workplace using competencies that are included in Tier 3. Engineers are team players that employ business fundamentals with internal collaborators and external clients and stakeholders.
  + Engineers approach on-the-job challenges with solutions – working with tools and technology, and leveraging project management skills and keen attention to detail to achieve a project’s desired results.
  + In the workplace, effective engineers leverage their planning and organizational skills and creative thinking ability to approach challenges with solutions.

Slide 33: Technical Competencies: Tier 4

* Goals:
  + Present the fourth tier of the model
* Notes/Talking Points
  + Tier 4 highlights essential industry-wide competencies.
  + From the office to the field, engineers’ technical competencies are key. Engineers practice the foundations of engineering – overlaying industry-wide knowledge with discipline-specific expertise, while maintaining a continual focus on the pillars of engineering design, quality, sustainability, security, and ethics. Manufacturing and construction; operations and maintenance; business, legal and public policy; engineering economics; and quality control and assurance are additional vital industry-wide competencies.
  + As mentioned earlier, we consider this a "Tier 4" model, which means that it addresses industry-wide requirements that are common to all sectors of engineering.  It does not go into the requirements unique to specific branches of engineering which is why there is no Tier 5 at this time.

Slide 33: Engineering Outcomes

* Goals:
  + Relate the model to professionals’ application of it in advancing the engineering profession/workforce
* Notes/Talking Points
  + How can we meet the demand for more engineers? By inspiring people – smart, effective people – that want to work in a profession where they are empowered to solve the world’s challenges using a unique set of personal, academic, and technical skills.
  + When engineers apply these fundamental skills in their daily work, they design, improve, and sustain the systems and structures we rely on. As a result, our roads and bridges are safer, our cars are more dependable, our food and water supplies are healthier, and we are more globally connected than ever before.
  + By leveraging this integrated system of core engineering competencies, we are building high caliber engineers of the future that will equip the industry to amplify its growing impact.
  + Become an engineer, and you too can help to solve the world’s problems competently and with confidence.

Slide 34: Call to Action - What Can You Do?

* Goals:
  + Presents ways for individuals to get involved with sharing and building the model
  + Create a call to action to learn more and further engage with the model
* Notes/Talking Points
  + You can help increase the awareness and impact of the model – a goal that cannot be achieved without support from industry leaders and champions of the model.
  + **Help build the engineering workforce of the future by:** 
    - **Adopting the model** in your workplace, across your association, or in your classroom
    - **Developing a Tier-5 model** to build on the Engineering Competency Model with discipline-specific competencies and technical skills
    - **Sharing the content and value of the model** with educators, guidance counselors, administrators, students, and parents to increase awareness and interest in engineering
    - **Strategizing real-world applications** for how the model can be leveraged in academic curricula, workplace trainings, and beyond
    - **Providing feedback** on the model and its use

Slide 35: Closing –Help Build the Engineering Workforce of the Future

* Goals:
  + Create a call to action to learn more and further engage with the model
* Notes/Talking Points
  + Help build the engineering workforce of the future.
  + Visit the Competency Model Clearinghouse at [www.careeronestop.org/CMC/engineering](https://www.careeronestop.org/CMC/engineering) to learn more about the Engineering Competency Model and access additional resources related to the model.
  + This presentation and the development of the model was made possible through a grant by the United Engineering Foundation.

1. BLS 2016-2026 employment projections, <https://www.bls.gov/emp> [↑](#footnote-ref-1)
2. BLS 2016-2026 employment projections, <https://www.bls.gov/emp> [↑](#footnote-ref-2)