



# DOE PROJECT MANAGEMENT NEWS

Promoting Project Management Excellence

DECEMBER 2019



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### Director's Corner

This month's newsletter features an article on cost estimate classification and its relationship to the maturity of design deliverables. As one might expect, the accuracy of the cost estimate matures in parallel with the design. The initial cost estimate range at critical decision (CD)-0, *Approve Mission Need*, is generally based on cost or capacity curves, or other parametric and modeling techniques, and is expressed as a cost range vice a point estimate. The associated design may consist of nothing more than block flow diagrams. As the design matures, so does the cost estimate. Eventually, the cost range evolves into a point estimate with sufficient fidelity that it can be used to support the budget request and ultimately the establishment of the performance baseline. I encourage you to read and understand the article so you can explain to non-project management professionals, the evolution of an estimate and the importance of ensuring that a project's early cost estimate range is sufficiently conservative to bound the potential range of alternatives should the need arise.

Also featured this month are some lessons learned from a recent EVMS certification visit to the Waste Isolation Pilot Plant in Carlsbad, New Mexico.

Spoiler alert: EVMS certification is a process not an event, and sometimes we have to request external assistance and experience some "healthy tension" in order to strengthen our project controls accuracy and reliability.

Planning is well underway for the 2020 DOE Project Management Workshop. Please mark your calendars for April 14th - 15th, 2020, for the project management sessions, followed by a third day on April 16th, which will be split between a project controls session in the morning, and Program office breakout sessions in the afternoon. Additional information on the Workshop and the registration process will be provided in next month's newsletter.

Finally, with the holiday season just around the corner, plan ahead and stay safe. Whether you are traveling on the roads, hanging decorations outside, or using the fireplace inside, please take precautions to ensure you and your loved ones remain safe and injury-free throughout the season. Enjoy the holiday season and time with your family and friends.

Happy Holidays!

*Paul Bosco*

## Cost Estimate Classification and Maturity of Design Deliverables, and How Cost Ranges Are Derived

Michael Fenn, Office of Project Assessments (PM-20)

DOE uses the industry's widely accepted cost estimate classification system that is outlined in the AACE International recommended practice (RP) 18R-97, *Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*<sup>1</sup>. Table 1 below outlines how a cost estimate classification aligns with the primary and secondary characteristics, maturity level of project deliverables, end usage for the estimate, methodology used in developing the estimate, and "expected accuracy range" or uncertainty range for a given cost estimate. This cost estimate classification system provides a relationship between project design maturity with estimate accuracy and typical methodology used to develop the estimate. The RP also discusses how the estimate accuracy range is driven by many other variables as well as risks associated with the project. In the RP, AACE International also emphasizes that the RP is a guide

and provides generally accepted practice, but is not a standard. When the Office of Project Management (PM) completes an independent cost review (ICR) or an independent cost estimate (ICE) report, the team often refers back to this table to determine the estimate class, and based on this estimate class determination, assigns expected estimate uncertainty ranges. This methodology is generally used prior to critical decision (CD)-0, *Approve Mission Need*, and CD-1, *Approve Alternative Selection and Cost Range*.

At CD-0, a project cost estimate is typically at class 5 or class 4 as the program office may have devoted just enough resources to develop a rough order of magnitude (ROM) cost estimate for a pre-conceptual design or a feasibility study. Project design at this stage is often pre-conceptual in nature with approximately 2% or less of overall project engineering deliverables (e.g., process flow diagrams, piping and instrument diagrams, process equipment list, specification and data sheets, etc.) completed.

**Table 1. Cost Estimate Classification for Process Industries**

ESTIMATE CLASS	Primary Characteristic	Secondary Characteristic		
	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to 100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assemble line level items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to 15% H: +5% to 20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

<sup>1</sup> While AACE International recommended practices exist for other industry sectors such as Building and General Construction (RP 56R-08), and Mining and Mineral Processing Industries (RP 47R-11), PM utilizes RP 18R-97 due to the technical complexity of most DOE/NNSA projects.

As the project progresses towards CD-1, and as the project team matures the design, the cost estimate should be at class 4 or possibly approaching class 3. The determination of the estimate class is made by assessing the maturity level of project design deliverables.

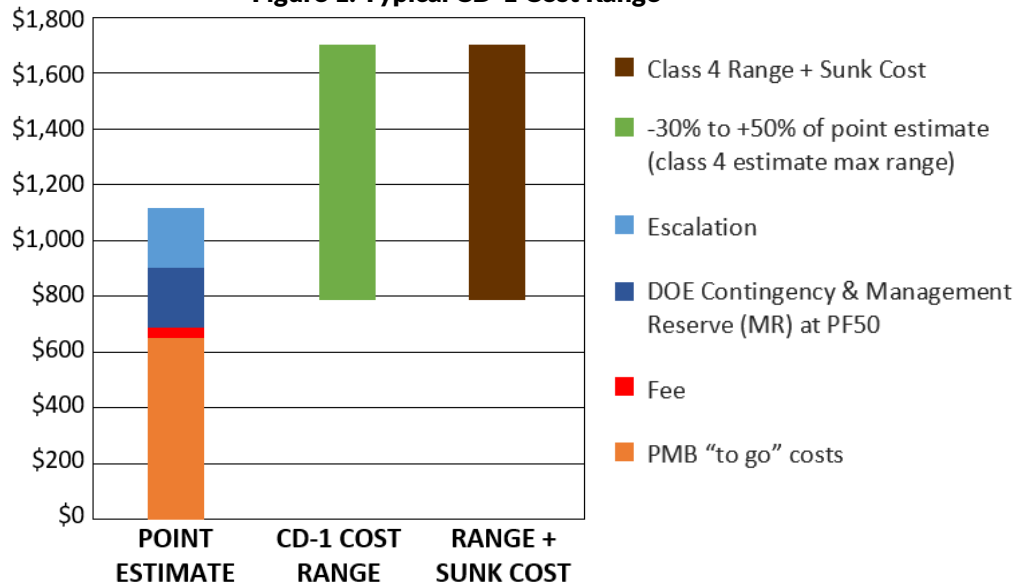
At CD-1, design is usually between 1% to 15% complete depending on the amount of engineering deliverables completed by the project team.

For projects with a total project cost (TPC) equal to or greater than \$100 million, the PM estimating team will review and consider the methodology used for preparing the estimate in determining the estimate class. The PM team will also assess how the project team has classified the cost estimate to inform its final determination. In the majority of the cases, the estimate class determined by the project team and the PM team are the same.

Once the estimate has been classified, an expected cost estimate uncertainty range is applied as a means to bound the high end and low end of the cost estimate. This range is applied to the point estimate, less sunk costs, which includes contingency calculated through a quantitative risk analysis at the 50% confidence level at the time of cost estimate preparation. Figure 1 "Typical CD-1 Cost Range" illustrates this process.

As the project progresses towards CD-2, *Approve Performance Baseline*, the project team should have

**Figure 1. Typical CD-1 Cost Range**



completed the engineering deliverables and matured the design for non-nuclear projects sufficiently to prepare a project baseline with 80% to 90% confidence to satisfy the CD-2 requirements. Designs for nuclear projects must be 90% complete prior to baselining at CD-2. With the maturity of the project deliverables, the project should have progressed to classify the estimate to be at class 2 or class 1 estimate. At this stage, the PM team will perform an ICE to validate the TPC proposed by the project team. The PM ICE will not include an upper and lower cost range but will result in a point estimate which will include expected contingency and management reserve costs for discrete risks, plus estimate uncertainty, at the 80% to 90% confidence level. If the project estimate developed at CD-1 had gone through a design maturity process without significant scope changes, in theory and often in practice, within DOE, the CD-1 cost ranges will have sufficiently bound the cost estimate such that at CD-2 (or CD-2/3), the TPC baselined for the project will fall within the cost range.

## Congratulations to our Newly Certified FPD!



**Level I**  
**Cheuk Kwok (SC)**



### ATTENTION:

**The FPD application process is changing!**  
PMCDP is streamlining the application in ESS, effective December 17, 2019. Contact [PMCDP.Administration@hq.doe.gov](mailto:PMCDP.Administration@hq.doe.gov) for support as we migrate to the new application process.

## Sharing Lessons Learned from Successful Earned Value (EV) Certification

Robert Loop, Office of Project Controls (PM-30) and Mario Carrasco, Nuclear Waste Partnership

A DOE contractor achieved earned value management system (EVMS) certification in just six months following the onsite review. This is all the more notable because Nuclear Waste Partnership (NWP), the Carlsbad NM Waste Isolation Pilot Plant (WIPP) site support contractor, had a critical decision (CD)-2 external independent review (EIR) review about a year before the certification which suggested there was still a great deal of work required to develop and implement an EIA-748 compliant system.

WIPP, a small site in the DOE complex with 850 full-time employees, is the location of the country's deep-geological permanent repository for legacy defense-related transuranic waste. The remote southeastern New Mexico location creates logistical challenges for supplies and limited labor resources that can support engineering and radiological activities.



WIPP suffered two separate accidents in 2014, one involving an underground fire and the other a radioactive release, which resulted in a three-year shutdown. Two capital asset projects were authorized to provide up to 540,000 cubic feet per minute (cfm) of necessary ventilation to the underground mine drifts and shafts and installation of a new HEPA filtration system, a new 2,150-foot utility shaft, and an above-ground Safety Significant Ventilation Confinement System to support full underground operations. These projects required NWP to obtain EVMS certification prior to approval of CD-2/3.

In order to prepare for the EVMS certification during the three-year shutdown, NWP and subcontract personnel expended considerable effort in implementing the Cobra cost-processing system, upgrading the Primavera (P6) scheduling system, integrating with the financial system, and developing

processes, procedures and the system description. Extensive participant training and continuous learning were necessary which, along with additional EFCOG participation and the application of lessons learned by observation of an on-site review at another DOE facility, led to a successful review.

NWP, recognizing and accepting its limitations, reached out to peers at Hanford WRPS, Oak Ridge ETTP and Savannah River SRS. Numerous internal and external reviews helped NWP continue to make improvements. The recommendations from those reviews were not always easy to accept but NWP saw the value in listening to those who have traveled the certification road previously. NWP developed a corrective action management plan (CAMP) prior to the final certification report based on the draft corrective action requests.

NWP attributes the successful review directly to the following:

- [Creating a teaming relationship with PM-30](#)
- [Providing data to PM-30 prior to assist visits for analysis](#)
- [Embracing PM-30 site assist visits and comments](#)
- [Having open and candid conversations during the visits](#)
- [Accepting interpretation differences](#)
- [Having a project team committed to earning certification](#)
- [Having a management team committed to earning certification](#)
- [Having a corporation committed to earning certification](#)
- [Having the FPD and Carlsbad Field Office committed to earning certification](#)
- [Early and often corrective action management plan \(CAMP\) reviews](#)

Conclusion – A certification is not an event but rather a process. Early two-way communication was the key. NWP was open to feedback, listened and made continual course corrections. In doing so, between the EIR and the certification, the contractor went from limited expertise to full compliance. This minimized the impact of the onsite review on the project team and site operations, and reduced overall cost to the contractor, the Program office and PM.

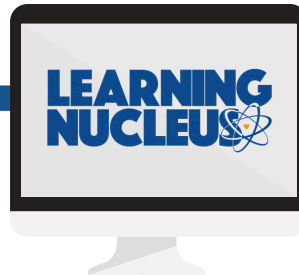
## PMCDP Training Information at Your Fingertips...If you know where to look!

Linda Ott, Office of Professional Development (PM-40)

The Learning Nucleus (LN), launched earlier this year, makes it easier to find PMCDP training and other information to help you plan your training to obtain FPD certification or to find continuous learning opportunities. You've used the LN for mandatory training; let's identify where to look for training and continuous learning related to PMCDP.

### There are two ways to get to PMCDP Courses in the LN!

#### Directly to the LN



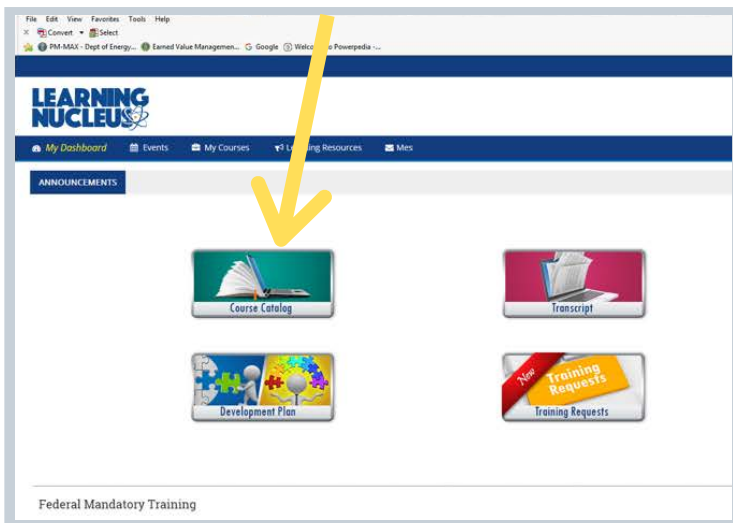
#### Through ESS

Access the LN portal directly at <https://learningnucleus.energy.gov/> and log in using your unique username and password.

Log into ESS at <https://ess.doe.gov/> and go to "Training" on the menu bar.

To get there from the dashboard:

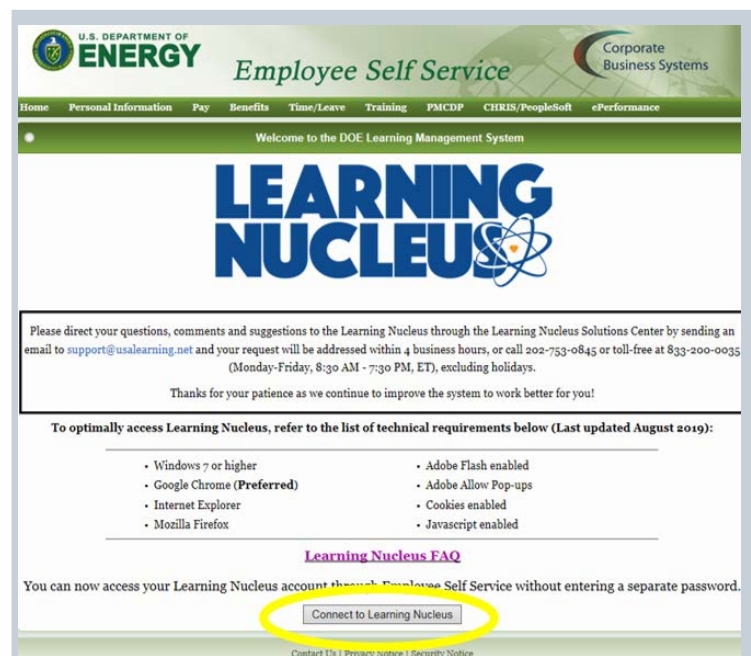
1. Select "Course Catalog", yellow arrow in the screen shot below.
2. Select the "DOE-Wide Catalog" then "PMCDP".



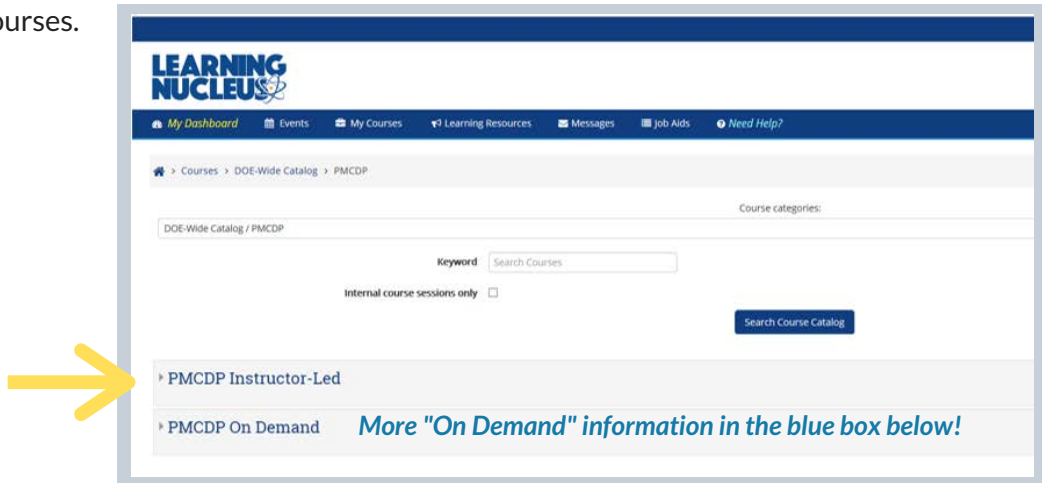
1. Select "Learning Nucleus", circled in yellow on the screenshot below.



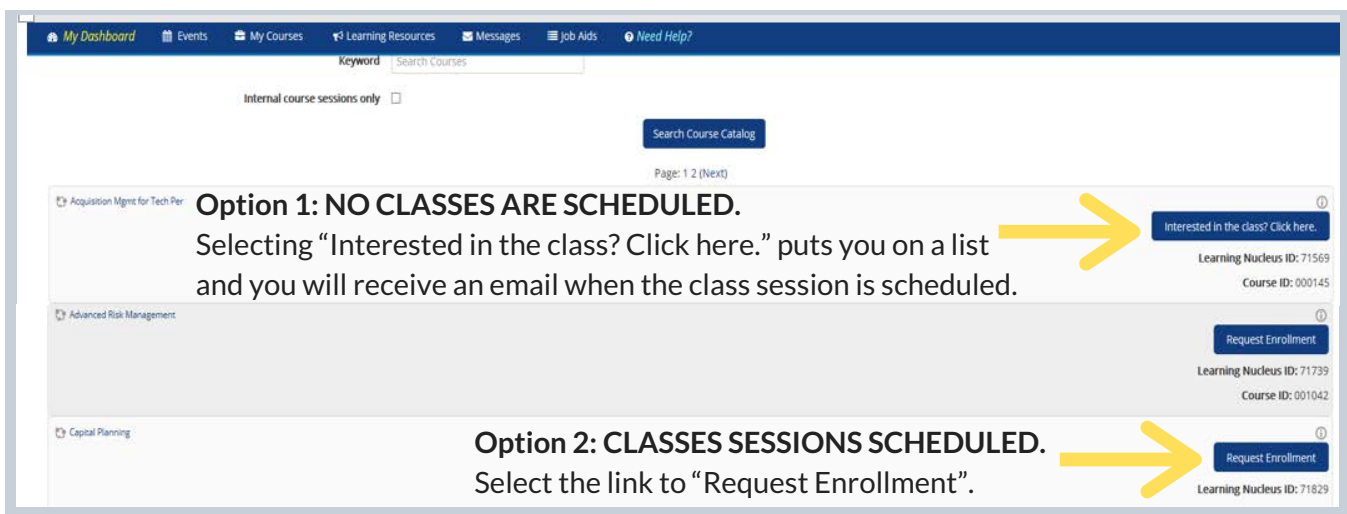
2. Continue by selecting "Connect to the Learning Nucleus", circled in yellow on the screenshot below.



After selecting "Course Catalog" → "DOE-Wide Catalog" and → "PMCDP", an expandable menu opens for "PMCDP Instructor-Led" courses.



There are two options depending on whether a class session is scheduled.



Selecting the "PMCDP On Demand" opens online offerings and a few other things. You will also find:

- **Certification Equivalency Guidelines (CEG)** provides information about requirements and applying for FPD certifications.
- **An interactive PMCDP curriculum map** shows all the courses in the PMCDP curriculum and provides a bridge to the PMCDP classes and where to find them — shows which are classroom, desktop and online offerings.
- **A short animated video of the History of PMCDP** that shows the evolution of the curriculum and where it is heading over the next few years. The video was created to test the concept of adding more animation to our online offerings. Check it out and tell us what you think.

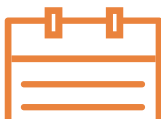
Don't forget to bookmark your favorite LN pages!



### Questions?

For PMCDP courses please contact the following PMCDP LN Administrator:  
Ruby L. Giles; ruby.giles@hq.doe.gov; 202-287-1859

For technical assistance, contact the LN Solutions Center at support@usalearning.net and your request will be addressed within 4 business hours, or call 202-753-0845 or toll-free at 833-200-0035 (Monday-Friday, 8:30 AM – 7:30 PM, ET)  
For more info: Learning Nucleus FAQs



## PMCDP FY20 Training Schedule

The training schedule is posted on PM MAX. Save the direct link to the PMCDP Training Schedule to your favorites: <https://community.max.gov/x/BgZcQw>

Course Title	PMCDP LN Code	Length	CLPs	Planned Delivery Timeframe	Delivery Mode	Location/ Platform	Training POC	Instructor
<b>FY 20 – 2<sup>nd</sup> Quarter</b>								
Facilitating Conflict Resolution	001558		24	Wednesdays 12-1:30pm 1/8-2/26/20 (5 webinars, exam, eval)	Desktop	Adobe Connect	N/A	Peter Bonner
Project Management Simulation	001029	5 Days	40	1/13-1/17/20	Classroom	Richland, WA	Pamela Weichel	Larry Suda
Advanced Risk Management	001042	3.5 Days	28	1/14-1/17/20	Classroom	Oak Ridge, TN	Peter Rivera	Chris Gruber
Project Management Systems and Practices in DOE	001024		60	Tuesday/Thursday 1pm-3pm 1/21-3/10/20	Desktop	Adobe Connect	N/A	Dana Krupa
Systems Engineering	001049	3 Days	24	1/22-1/24/20	Classroom	Argonne, IL	Sandra Geib-Ingram	Ken Mosteller
Executive Communications	001031	3 Days	24	1/28-1/30/20	Classroom	Oak Ridge, TN	Peter Rivera	Shelley Simms
Scope Management Baseline Development	001036	3 Days	24	1/28-1/30/20	Classroom	Aiken, SC	Leatrice Green	Sean Casey
Federal Budgeting Process in DOE	001034	4 Days	32	2/18-2/21/20	Classroom	Oak Ridge, TN	Peter Rivera	Sean Casey
Systems Engineering	001049	3 Days	24	2/25-2/27/20	Classroom	Aiken, SC	Leatrice Green	Ken Mosteller
Project Risk Analysis and Management	001033	3.5 Days	28	3/3-3/6/20	Classroom	Oak Ridge, TN	Peter Rivera	Sean Casey
Front -End Planning	003176		20	Tuesday/Thursday 1pm-3pm 3/10-4/9/20	Desktop	Adobe Connect	N/A	Sean Casey Ed Worth
Strategic Planning	001043	3 Days	24	3/10-3/12/20	Classroom	Lemont, IL	Sandra Geib-Ingram	Marvin Gunn
LEED for New Construction and Existing Buildings	001936	2.5 Days	20	3/16-3/18/20	Classroom	Richland, WA	Pamela Weichel	Jason Kliwinsky
Managing Contract Changes	002102	4 Days	32	3/23-26/20	Classroom	Aiken, SC	Leatrice Green	Jerry Zimmer
Advanced Risk Management	001042	3.5 Days	28	3/30-4/2/20	Classroom	Idaho Falls, ID	Tina Wagoner	Chris Gruber
<b>FY 20 – 3<sup>rd</sup> Quarter</b>								
Cost and Schedule Estimation and Analysis	001044	5 Days	40	4/6-4/10/20	Classroom	Richland, WA	Pamela Weichel	Sean Casey

**Mark your calendar! 2020 PM Workshop, 14-16 April 2020, Hilton Washington DC, National Mall, details to follow.**



## PMCDP FY20 Q3-Q4 Training Schedule

The training schedule is posted on PM MAX. Save the direct link to the PMCDP Training Schedule to your favorites: <https://community.max.gov/x/BgZcQw>

Course Title	PMCDP LN Code	Length	CLPs	Planned Delivery Timeframe	Delivery Mode	Location/ Platform	Training POC	Instructor
<b>FY 20 – 3<sup>rd</sup> Quarter (continued)</b>								
Project Risk Analysis and Management	001033	3.5 Days	28	4/20-23/20	Classroom	Aiken, SC	Leatrice Green	Sean Casey
Leadership through Effective Communication	002366	3 Days	24	5/11-5/13/20	Classroom	Richland, WA	Pamela Weichel	Mac Bogert
Cost and Schedule	001044	5 Days	40	5/11-5/13/20	Classroom	Aiken, SC	Leatrice Green	Sean Casey
Planning for Safety in Project Management	001035		28	Tuesday/Thursday 1pm-3pm 5/27-7/1/20	Desktop	Adobe Connect	N/A	Dana Krupa
Advanced Risk Management	001042	3.5 Days	28	6/15-18/20	Classroom	Aiken, SC	Leatrice Green	Chris Gruber
<b>FY 20 4<sup>th</sup> Quarter</b>								
Acquisition Management for Technical Personnel	000145		16	Monday/Wednesday 12pm-4pm 6/22-7/1/20	Desktop	Adobe Connect	N/A	Jerry Zimmer
Monitoring and Controlling <i>Pilot</i>		3 Days	24	TBD Q3	Classroom	TBD	TBD	
Project Management Systems and Practices in DOE	001024		60	Tuesday/Thursday 1pm-3pm 7/14-9/1/20	Desktop	Adobe Connect	N/A	Dana Krupa
Advanced Earned Value Management Techniques	002689	3	24	8/4-6/20	Classroom	Argonne, IL	Sandra Geib-Ingram	Gary Humphreys
Planning for Safety in Project Management	001035		28	Tuesday/Thursday 1pm-3pm 8/27-10/1/20	Desktop	Adobe Connect	N/A	Dana Krupa

All PMCDP Course Descriptions and Course Materials can be found in the Course Catalog on



Save the direct link to your favorites:

<https://community.max.gov/display/DOEExternal/PM+PMCDP+Course+Catalog>

Or download the Interactive Curriculum Map:

<https://community.max.gov/download/attachments/1131743153/PMCDP%20Interactive%20Map.pdf?version=1&modificationDate=1512482483778&api=v2>



Have a question, found a bug or glitch in a PMCDP online course, or want to provide feedback?

Submit your questions through [PMCDPOnlineCourseSupport@hq.doe.gov](mailto:PMCDPOnlineCourseSupport@hq.doe.gov)



## Contact Us!

The Office of Project Management welcomes your comments on the Department's policies related to DOE Order 413.3B. Please send citations of errors, omissions, ambiguities, and contradictions to [PMpolicy@hq.doe.gov](mailto:PMpolicy@hq.doe.gov). Propose improvements to policies at <https://hq.ideascale.com>.

If you have technical questions about PARS, such as how to reset your password, please contact the PARS Help Desk at [PARS\\_Support@Hq.Doe.Gov](mailto:PARS_Support@Hq.Doe.Gov). And as always, PARS documentation, Frequently Asked Questions (FAQs) and other helpful information can be found at <https://pars2oa.doe.gov/support/Shared%20Documents/Forms/AllItems.aspx>

The current PARS reporting schedule is located in PM-MAX at the following link <https://community.max.gov/x/m4IIY>.

Can't find the Word templates to prepare to apply for FPD certification? The Certification and Equivalency Guidelines (CEG) isn't where you last found it and you are not sure where to look? Use the [PMCDP.Administration@hq.doe.gov](mailto:PMCDP.Administration@hq.doe.gov) mailbox.

Can't put your finger on a document or information you were told is available on PM-MAX? Looking for information on DOE Project Management? Submit your questions and queries to [PMWebmaster@doe.gov](mailto:PMWebmaster@doe.gov). Check out the links below for information related to FPD Certification and Certification and Equivalency Guidelines.

FPD Certification Application Templates  
<https://community.max.gov/x/uAd1Qw>

Certification and Equivalency Guidelines  
[https://community.max.gov/download/attachments/1131743160/June\\_2015\\_CEG\\_FINAL.pdf?version=1&modificationDate=1472838487652&api=v2](https://community.max.gov/download/attachments/1131743160/June_2015_CEG_FINAL.pdf?version=1&modificationDate=1472838487652&api=v2)



Find up-to-date information and resources anytime on PM-Max!

► 113 Resource Center ► Reviews & Metrics ► PARS & Earned Value Management ► Training & Certification ► Workshops & Awards ► About PM ► ENERGY

To reach the Professional Development Division team:



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If you would like to contribute an article to the Newsletter or have feedback, contact the Editor at [Linda.Ott@hq.doe.gov](mailto:Linda.Ott@hq.doe.gov).

