


Blended Delivery for Complex Certification Programs

Seagate redesigns Six Sigma/Lean Training programs for increased flexibility and efficiency

– **Chris Howard**, *Principal Analyst* | May 2006

▶ IN THIS CASE STUDY

This case study examines how blended delivery can contribute toward the mastery of complex training topics. Many companies have rushed into e-learning by moving entire programs online, only to discover that certain topics require a blended approach. Seagate has successfully blended multiple learning modalities, leveraging the strength of each delivery mechanism to help students master quality improvement tools and methodologies.

Seagate's Business Excellence training program is tasked with expanding the uptake of Lean Manufacturing, Six Sigma, and Design for Six Sigma initiatives, which, by company estimates, have saved the company more than \$1 billion. This case study looks at how Seagate combined multiple learning programs into a single university-style curriculum, added an e-learning component for blended delivery, and now offers a more flexible approach to the certification process. 

FOCUS:

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**LEARNING
PROGRAMS**

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TECHNOLOGY

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TABLE OF CONTENTS

IN THIS CASE STUDY	1
SEAGATE OVERVIEW	4
BUSINESS ENVIRONMENT	4
THE SEAGATE LEARNING ENVIRONMENT	5
SEAGATE BUSINESS EXCELLENCE TRAINING	6
Applying the Lean Methodology to Training	7
Choosing a Content Vendor	8
Blending Instructor-Led Content with Online Content	8
Multitiered University Curriculum Promotes Role-Based Training	9
MEASURING SUCCESS	13
LESSONS LEARNED	14
Rearchitect the Program from the Ground Up	14
Blended Learning Prepares Students for Mastery of Complex Topics	15
Managing Gradual Change	15
CONCLUSION	16
APPENDIX	
DFSS Curriculum - Pre-Class WebEx and Week 1	17
DFSS Curriculum - Week 2	18
DFSS Curriculum - Week 2	19

ABOUT US	20
ABOUT THIS RESEARCH	20

TABLE OF FIGURES

Figure 1 – Seagate Business Excellence – Educational Model	10
Figure 2 – Transactional Curriculum Example	10
Figure 3 – Reductions in Classroom Hours	13

Seagate Overview

Founded in 1979, Seagate was the first company to build 5.25-inch hard disk drives for personal computers. Today, Seagate is a leader in the design, manufacture, and marketing of hard disk drives, providing products for a wide range of enterprise, desktop, mobile computing, and consumer electronics applications. Seagate was recently named 2006 Company of the Year by *Forbes* magazine. The company reported record revenue of \$2.3 billion for the quarter ended December 30, 2005, up 25 percent over 2004.

Seagate focuses on continuous quality improvement in both operational activities, including research and development, product design, manufacturing, and transactional activities, such as human resources, finance, and customer support. Seagate's Business Excellence Learning group is responsible for the creation and delivery of educational content linked to all quality improvement initiatives, including Lean Manufacturing, Six Sigma, and Design for Six Sigma. Approximately 1,500 to 2,000 employees are certified in Lean, Six Sigma, and DFSS each year.

Business Environment

The disk drive industry continues to grow, driven by competition for higher performance, better quality, and lower cost. Seagate's business model leverages quality improvement initiatives, such as Lean Manufacturing and Six Sigma, to deliver high-quality products to its global customers, and to be the lowest-cost producer in all markets in which it participates.

Brief Primer on Six Sigma and Lean Manufacturing

Six Sigma is a business-driven, multifaceted approach to process improvement, reduced costs, and increased profits. With a goal of improving customer satisfaction by reducing defects, Six Sigma's ultimate performance target is virtually defect-free processes and products. The methodology is the road map to achieving this goal. Within this framework, it is the responsibility of the improvement team to identify the process, the definition of defect, and the corresponding measurements.

Design for Six Sigma (DFSS) is the application of Six Sigma principles to the design of products and their manufacturing and support processes. DFSS can apply to the design or a product, manufacturing process, business process or service.

The goal of Lean Manufacturing (Lean) is to target nonvalue-added activities such as overproduction, motion, inventory, waiting, transportation, defects, underutilized people, and extra processing. In other words, Lean looks for those activities that do not add value and then eliminates, reduces, simplifies, or integrates those activities or processes.

Seagate believes that Lean Manufacturing and Six Sigma projects are key competitive advantages. As a result, Seagate has made it a strategic goal to have as many employees as possible certified in these methodologies. These employees comprise a large segment of Seagate’s global workforce of nearly 47,700.

e Seagate Learning Environment

Two distinct organizations are responsible for learning at Seagate. Under the direction of the Human Resources department, a Global Leadership and Learning group is responsible for the creation and delivery of all corporate education, except Business Excellence. The Global Leadership and Learning group covers a wide range of subject areas, such as information technology, management, finance, and health and safety training.

The second learning organization at Seagate, the Business Excellence Learning group, is the focus of this case study. The Business Excellence Learning group, which has two full-time equivalents, serves 10 directors of Business Excellence who are embedded within each of Seagate’s worldwide business units and responsible for deploying quality improvement projects at each unit. The leader of the Business Excellence Learning group is an educational development specialist and Principal Six Sigma Master Black Belt.

Each business unit has full-time and part-time instructors who are certified as Six Sigma Master Black Belts. The instructors previously were under a single centralized Business Excellence Learning organization. By putting the instructors directly under each business unit, Seagate has made each business unit more responsible for reaching its own learning goals.

Within this decentralized structure, the Business Excellence Learning group organizes content and curriculum, provides a learning infrastructure, and generally facilitates the processes that enable each business unit to drive quality improvement initiatives into daily operations. The Business Excellence Learning group acts as

Seagate believes that **Lean Manufacturing and Six Sigma** project deployments are key **competitive advantages**. As a result, Seagate has made it a **strategic goal** to have as many employees as possible **certified in these methodologies**.

Subject matter experts within the business units **act as instructors** to create and deliver the vast majority of learning content.

a shared services¹ organization for the business units.

Content is procured and produced by the Business Excellence Learning group, while delivery occurs in the business units.

Both learning organizations—Business Excellence Learning and Global Leadership and Learning—report to vice presidents, who report to the CEO of Seagate. The groups share same technology platform and Learning Management System (LMS), which is administered by HR resources.

The Business Excellence Learning group acts as a **shared services organization** for the business units. Content is procured and produced by the Business Excellence Learning group, while **delivery occurs in the business units.**

Seagate Business Excellence Training

Seagate began Six Sigma training in 1998. A few years later, Design for Six Sigma and Lean Manufacturing initiatives were adopted by the company. In total, more than 8,000 technical professionals in all three methodologies have been trained by Seagate. Until 2004, all instructional content was internally developed and delivered by instructors who were certified Master Black Belts, but not necessarily instructional designers. Content delivery and terminology varied significantly as instructors customized courses to their own knowledge and abilities.

Training was delivered in a classroom environment using a combination of Microsoft PowerPoint presentations and notes. Participant material was limited to copies of PowerPoint slides. Classroom training also meant that students had to spend time away from their jobs, which sometimes was perceived as lost productivity.

Although Seagate was successfully certifying technical professionals, the learning program suffered from an **overreliance on classroom training and redundancy in content and materials.**

The curriculum was rigid, making it difficult for a student to get trained as, say, a Green Belt, and then come back in a year for Black Belt certification without having to repeat classes to refresh their knowledge of fundamental concepts. Finally, because training materials were developed ad hoc, approximately 60 to 70 percent of the course content overlapped. This meant employees seeking training or certification in multiple methodologies were forced to study redundant material.

¹ For more information on shared services organizations and structure please refer to the Bersin & Associates industry report *The High-Impact Learning Organization* at <http://www.bersin.com>.

Applying the Lean Methodology to Training

In 2004, Seagate's corporate Business Excellence organization undertook a global initiative to redesign the entire learning process. Starting with a top-down application of Lean concepts and principles to the learning process, the group came to the following conclusions:

- The operational and transactional staff at Seagate is linked to a single supply chain;
- Quality improvement initiatives have similar methodologies and toolkits;
- Practitioners of Six Sigma often need to apply Lean tools, and Lean teams often need to use Six Sigma tools; all methodologies could be combined under the umbrella of Business Excellence;
- Seagate could set up a university-style curriculum focused on the concept of deploying operational and transactional quality improvement projects using the best tools available from any methodology;
- The new Business Excellence curriculum could enable Seagate to introduce new quality improvement methodologies with a high level of credibility and acceptance by instructors and students;
- Instructor-led training could be complemented by self-paced e-learning, which could provide foundational instruction and refresher courses, allowing students in the classroom to focus on projects, case studies, mentoring, and interaction;
- The number of days required for training could be reduced, and students could have greater flexibility to achieve a basic level of certification and return later to attain higher levels.

Seagate applied **Lean Manufacturing principles** to simplify and integrate multiple learning programs into **a single university-style curriculum**.

Instructor-led training is **complemented by self-paced e-learning**, which provides **foundational instruction and refresher courses**, allowing students in the classroom to focus on projects, case studies, mentoring, and interaction.

Choosing a Content Vendor

The 320-plus PowerPoint presentations developed by Seagate instructors had value, but content had to be streamlined to eliminate redundancies. In addition, new content was needed to bring subject matter up to date with the latest developments in quality improvement processes. Finally, the 60-plus modules of content had to be reorganized into a new unified curriculum that fit a blended delivery approach.

The Business Excellence Learning group conducted an exhaustive search for commercial, off-the-shelf content that would best meet organizational requirements:

- The group identified 21 vendors with online content for Lean and Six Sigma and support for blended delivery.
- An initial benchmarking of the content cut the field of vendors in half, as the group eliminated vendors whose terminology did not match Seagate’s or whose material was deemed less than superior.
- The group accessed the actual courseware for a hands-on evaluation of the content from a student’s perspective. Decision criteria included how engaging the content was deemed and whether certain basic technical requirements, such as bookmarking, were met.
- Three vendors who met the evaluation criteria moved to the last round of RFP proposals.

Blending Instructor-Led Content with Online Content

Blended learning merges e-learning with traditional instructor-led training (ILT). Complex subjects such as Lean, Six Sigma, and statistics are an excellent fit for a blended learning format because of the intricate subject matter. Students have the opportunity to learn the basics online with 24x7 access to courseware, reference materials, and work aids. Classroom time is focused on project work and coaching.

The Business Excellence Learning group **evaluated 21 vendors** in the search for commercial, off-the-shelf content that would best meet organizational requirements.

The vendor chosen by Seagate, The Quality Group, was first tasked with aligning their online modules with Seagate’s PowerPoint slide modules. Seagate assembled a team of five Master Black Belt instructors to comb through the internal content and eliminate redundant material. Next, the Seagate team worked closely with the vendor to customize the vendor’s online modules with Seagate material, including background information, philosophy, and examples. The vendor also shortened some modules and created other new modules to cover content specifically requested by Seagate.

Many of Seagate’s PowerPoint slides and notes were overloaded with information, which, according to the content provider, could potentially result in poor educational outcomes. The vendor set and applied slide standards to create consistency in fonts, layout, and “white space”. The vendor also developed a seamless flow among modules and designed an instructor guide layout. Additional instructional talking points and teaching tips were added to the slides.

Each instructor-led training module now consists of (1) a first page with instructor preparation notes, (2) the module pages containing the content to be delivered, and (3) a last page with key terms, concepts, and tools to remember. This last part includes a summary of the module that links the different media together by referring to related online modules.

Multitiered University Curriculum Promotes Role-Based Training

Prior to developing a blended delivery curriculum for its Business Excellence Learning Program, Seagate assessed its content vendor’s complete online curriculum. By replacing the vendor’s online classes covering advanced concepts and content with instructor-led courses, Seagate developed a multitier learning architecture. Figure 1 provides a high-level overview of the model.

The vendor set and applied **slide standards to create consistency** in fonts and layout and “white space.”

The Educational Model

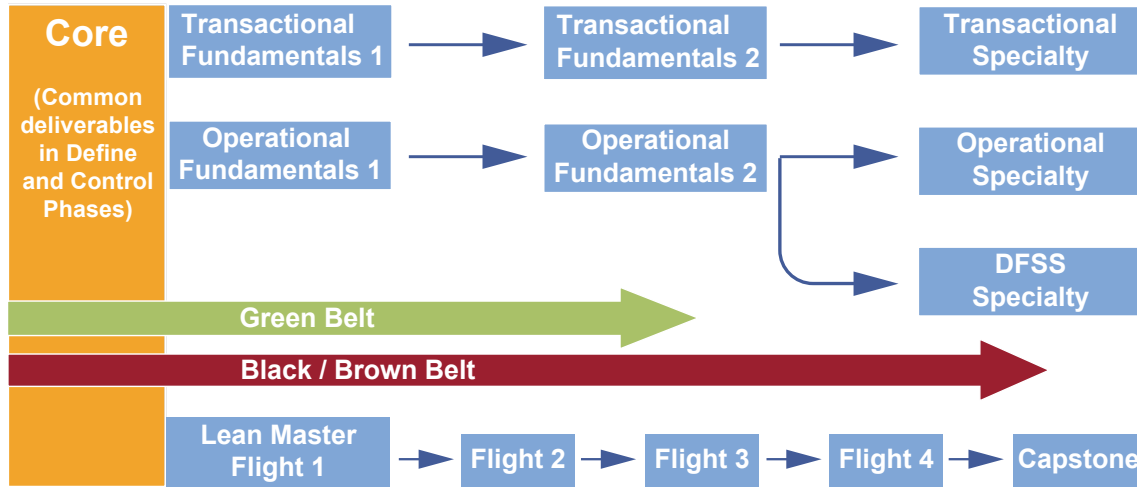


Figure 1: Seagate Business Excellence – Educational Model

This curriculum enables a more individualized, role-based approach to learning. There are separate learning paths for Green Belt and Black/Brown Belt candidates in operational and transactional functions. Figure 2 illustrates an example of a transactional curriculum.



Seagate developed a **multitier learning architecture** that enables a more **individualized, role-based approach** to learning.

Transactional Curriculum Example

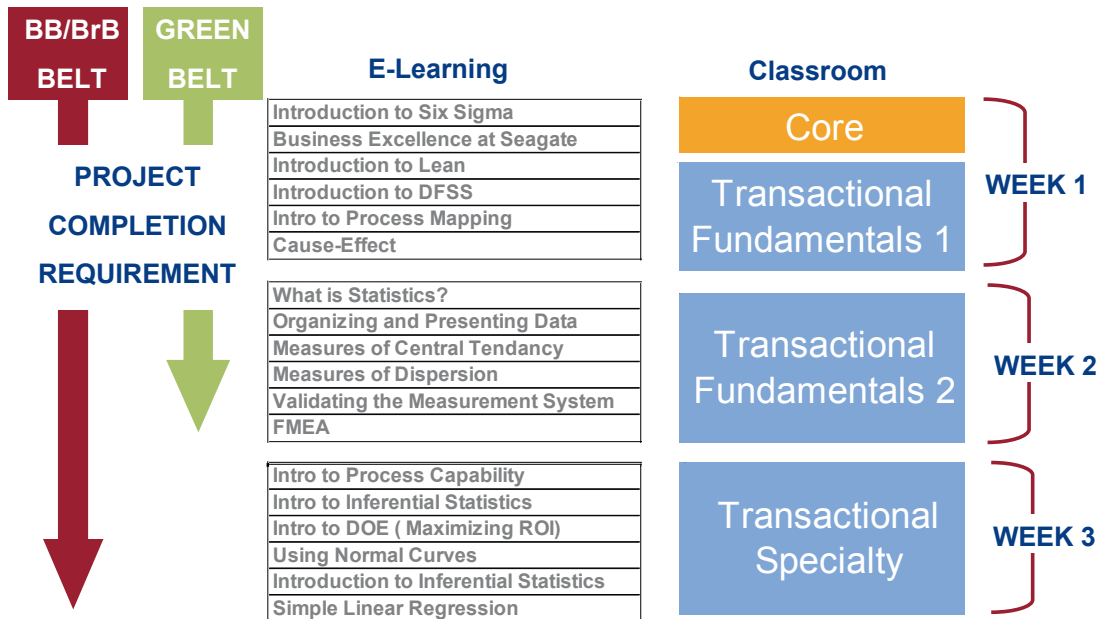


Figure 2: Transactional Curriculum Example

Pre-Class Virtual Classroom

All students are required to attend a Virtual Classroom at the start of their Business Excellence training. The two-and-a-half hour conference is recorded, enabling those unable to attend the conference to watch it at their convenience. Approximately 50 percent of students attend the live conference. The conference begins with an introduction to the Business Excellence Learning Program, emphasizing what candidates can expect from the program. A second hour is devoted to explaining the process for selecting and defining a quality improvement project. The session concludes with an orientation of the e-learning modules, which gives students basic information on how to use the online portal to take classes and exams.

Week 1 – Core Courses

● Core E-Learning Modules

There are five Core e-learning modules that must be completed by all operational and transactional candidates seeking any level of belt certification. These modules, which students are expected to complete in approximately 12 hours, reduce time spent in the classroom and enable students to revisit a topic at any time for a “refresher.” In terms of difficulty, the Core online modules are aimed at a Green Belt in an operational (i.e., technical) function. The e-learning modules cover the “what” and “why” of a particular topic, saving the “how” for later instructor-led training.

● Core Instructor-Led Courses

Before starting the instructor-led Core courses, every student must complete the following requirements:

- Attend Pre-Class Virtual Classroom, either live or recorded version
- Complete Core e-learning modules
- Prepare a draft of the project/problem statement, objective, and scope

There are two levels of Core courses in the Seagate Business Excellence curriculum. The first two days of Core classroom

The Core e-learning modules **reduce time spent in the classroom** and enable students to **revisit a topic** at any time for a “refresher.”

Instructor-led courses review many of the same concepts covered by the Core e-learning modules, but with **more depth**.

instruction are designed for candidates in both operational and transactional functions. These courses review many of the same concepts covered by the e-learning modules, but with more depth. New topics include problem definition, metrics, data and statistical thinking, change management, control, and mapping a process.

On the third and last day of Core classroom learning, operational and transactional employees diverge into separate tracks. The transactional classes, for example, focus on macro process maps and value stream mapping. The emphasis in these classes is on using Seagate-specific examples to illustrate higher-level concepts at work.

Week 2 – Fundamental Courses

● **Fundamental E-Learning Modules**

There are six Fundamental e-learning modules (*see Figure 2*) that must be completed by all operational and transactional candidates seeking Brown or Black belt certification. These modules focus on the complex subject of statistics. By explaining key concepts in advance, they help reduce time spent in the classroom and create a refresher that can be used to revisit a topic at any time.

● **Fundamental Instructor-Led Courses**

Before starting the instructor-led Fundamental courses, every student must perform the following requirements:

- Pass the Week 1 Certification Exam (online)
- Complete the online student survey
- Complete the Fundamental e-learning modules
- Conduct a local project review

Operational and transactional candidates continue to follow separate learning paths at the instructor-led Fundamental course level. A student who completes the Core and Fundamentals courses is certified as a Green Belt.

By explaining **key concepts** in advance, Fundamental e-learning modules **prepare students** for interactive, instructor-led classroom study.

Week 3 – Specialty Courses (Mentoring)

At the Specialty course level, Black/Brown Belt candidates diverge into separate learning paths, depending on their business unit and area of function within Seagate. They are assigned to a Black Belt mentor, who provides guidance and supervision as they successfully complete two quality improvement projects.

To earn certification as a Six Sigma Black Belt, a student must fulfill the following requirements:

- Pass the Week 2 Certification Exam (online)
- Complete two quality improvement projects
- Pass a doctoral-type examination conducted by a certified Black Belt

Specialty courses are like **graduate school** for Seagate technical-professionals who have attained **Green Belt** certification. The Specialty courses allow them to **gain real in-depth knowledge** specific to their job function.

Measuring Success

Seagate measures the success of its Business Excellence Learning program on many levels. One measure of success has been the reduction in classroom instruction. According to the leader of Business Excellence Learning, classroom training for Black/Brown Belts was reduced significantly after the implementation of the re-architected curriculum, while the Green Belt level stayed virtually the same. (see Figure 3).

CERTIFICATION LEVEL	PREVIOUS CLASSROOM TRAINING	CURRENT CLASSROOM TRAINING	TOTAL SAVINGS
Black / Brown Belt – Operational	20 days	14 days	6 days
Black / Brown Belt – Transactional	18 days	9 days	9 days
Green Belt – Operational	10 days	10 days	0
Green Belt - Transactional	6 days	6 days	0

Figure 3: Reductions in Classroom Hours

The Business Excellence Learning organization tracks the overall number of people who go through the program, as well as the

rates of certification at every belt level. The Business Excellence Learning group uses a departmental LMS that provides detailed measurement and reporting capabilities. Using checklists, the Business Excellence Learning group also conducts periodic audits of business units to examine how well quality improvement tools have been integrated into business processes. Although data is not available, deployment leaders report consistently higher levels of tool integration after training than before.

Other metrics of success are measured at the business unit and corporate level. Goals at this level include reduced defects, increased manufacturability, faster time to market (TTM), and increased equipment uptime. The company’s success in manufacturability, for example, is borne out by the fact that it can build any Seagate product on any Seagate production line around the world. As recently validated by a financial audit, Business Excellence Learning has led to more than \$1 billion of “hard” savings from quality improvements that range from reducing scrap and rework to better head count utilization.

Lessons Learned

Seagate’s experience in delivering a combination of instructor-led and e-learning modules may be helpful to other organizations that want to strengthen their quality improvement training programs.

Rearchitect the Program from the Ground Up

Years of ad hoc course development for three separate process improvement certifications had resulted in a classroom curriculum with lots of overlapping content. Rather than simply adding an e-learning component to its existing classroom curriculum—and creating further redundancies—Seagate management took a step back and looked at the larger picture. By tearing down the learning “silos” that separated Six Sigma from Lean Manufacturing, Seagate was able to create a unified curriculum that takes a holistic approach to certifying employees in quality improvement methodologies and tools. This new curriculum also makes it easier for an employee to get certified as a Green Belt, and then return for Brown Belt and Black Belt certification at a later date.

Business Excellence Learning has led to more than **\$1 billion** of “hard” savings at Seagate.

ANALYSIS

Twenty-five percent of the effort in converting a training program from instructor-led to blended involves content analysis to determine which material is best suited to each delivery type.

Seagate **tore down the learning “silos”** that separated Six Sigma from Lean Manufacturing, creating a **unified curriculum** for certifying employees in all aspects of quality improvement.

Blended Learning Prepares Students for Mastery of Complex Topics

Quality improvement methodologies and toolkits require mastery of highly complex subjects like statistical analysis. After years of Six Sigma and Lean Manufacturing training, Seagate came to believe that a classroom-only approach was not the most effective way to teach these complex subjects. Because employees have varying levels of educational background, some students were ready to learn statistics, while others were not. The instructors had to expend valuable class time reviewing basic concepts for some portion of the class.


By breaking out subject matter into different modalities, including self-paced e-learning, Seagate gives every student the ability to learn foundational concepts prior to classroom training. Now instructors focus on classroom exercises and other hands-on learning that reinforces the basic concepts learned online.

Managing Gradual Change

Many years of successful Six Sigma classroom training made instructors reluctant to embrace e-learning as a valid modality. Many instructors felt threatened by self-paced online learning, and felt that it would reduce the perceived value of the classroom instruction they had spent years developing. The instructors were also skeptical that employees could manage their own learning paths.

According to the group leader for Business Excellence Learning, change management was critical to the success of a new e-learning program. This meant getting all parties—management, employees, vendors, and especially instructors—involved early in the decision-making process. It also meant providing encouragement to instructors by pointing out that students who have taken e-learning modules will come to class better prepared for more advanced learning.

Another key piece of change management was the pilot program. Seagate rolled out the new blended curriculum in just two loca-



Seagate gives students the ability to **learn foundational concepts prior to classroom** training.

tions in the United States, while maintaining the old classroom-only curriculum everywhere else. This gave the Business Excellence Learning group time to refine the courseware and gauge the reactions of both employees and instructors.

Conclusion

At Seagate, blended learning moves beyond traditional training to a more systematic format that promotes ongoing learning. By enabling students to refresh their knowledge and learn foundational concepts using e-learning models, the blended curriculum delivers greater flexibility and reduces the required classroom time. By developing a strategy that merges a variety of learning activities, Seagate better uses its learning resources while offering employees improved performance support and the opportunity to continue to learn throughout their careers.

Seagate **encouraged instructors** to accept the new blended curriculum by emphasizing the **benefits of e-learning**.

DFSS Curriculum - Pre-Class WebEx and Week 1

WEEK 1 - Core (all business professionals) and Fundamentals 1 (Operational BB/BrB, GB and DFSS)

Pre-Class WebEx

E-Learning Modules

Core	
9:00	Intro. expectations
9:30	Intro to Six Sigma PRE01
10:00	Selecting and Defining a Project
10:30	PRE02
11:00	E-Learning Orientation, PRE03 Wrap-Up

Fundamentals 1

BE-201	Validating the Measurement System
BE-203	FMEA
BE-204	Intro to Process Capability
BE-205	Process Capability Assessments
BE-Stat101	What is Statistics?
BE-Stat102	Organizing and Presenting Data
BE-Stat103	Measures of Central Tendency
BE-Stat104	Measures of Dispersion

Deliverables (prior to Week 1)

Attend the Pre-Class WebEx
Complete the E-Learning modules
Prepare draft project problem statement, objective, scope

		Core Course		DFSS		Combined w/DFSS					
		Day 1		Day 2		Day 3		Day 4		Day 5	
8:00	Introduction to Business Excellence	Recap, Review	DFSS Introduction, Roadmaps	Roadmap, Methodology	Recap, exercise						
8:30	CORE01	Introduction to Data and Statistical Thinking	Quality Function Deployment	FOPRM	Capability Analysis						
9:00	Defining the Problem	CORE07		FMEA							
9:30	CORE02	Change Management		FOP05							
10:00											
10:30	Introduction to Theory of Constraints	CORE08		10. Data and Graphical Analysis (basic stats, histogram, Pareto, run chart)	FOP09						
11:00	CORE03										
11:30											
12:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:00	Metrics	Control	Strategic Planning	Using the Normal Curve, Other Distributions	PROJECT REVIEWS - Operational BB / BrB						
1:30	CORE04	CORE09	Taking a Systems Perspective	FOP07							
2:00	Introduction to Voice of the Customer, QFD	Mapping a Process	Design Concepts and Identifying KPIVs	MSA							
2:30	CORE05			FOP08							
3:00	Introduction to Cause and Effect	CORE10									
3:30	CORE06										
4:00											
4:30											
5:00											

DFSS Curriculum - Week 2

WEEK 2 - Fundamentals 2 (includes operational GB, BB, BrB and DFSS)

E-Learning Modules

BE-Stat201	Using Normal Curves
BE-Stat301	Intro to Inferential Statistics
BE-Stat302	Confidence Intervals for the Mean
BE-Stat303	Hypothesis Tests for the Mean
BE-Stat304	Comparing Means
BE-Stat305	Simple Linear Regression

	Day 1	Day 2	Day 3	Day 4	Day 5
8:00	Intro, agenda	Recap, exercise	Recap, exercise	Recap, exercise	Recap, exercise
8:30				Understanding Your Data	Project Reviews
9:00	Roadmap, Methodology, Review	19_Sample Size	ANOVA Exercise	Correlation	
9:30	Confidence Intervals		Regression w/MLR	Full Factorial Designs	
10:00					
10:30	Hypothesis Testing,				
11:00					
11:30					
12:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:00	Hypothesis Testing,	Multiple Variable Analysis	Regression w/MLR	Full Factorial Designs	
1:30					
2:00					
2:30					
3:00					
3:30	Contingency Tables		SPC, Continued (optional for DFSS)		
4:00					
4:30					
5:00					

Deliverables (prior to Week 2)

Complete the Week 1 Certification Exam (on-line)
Complete the on-line student survey
Complete the E-Learning modules
Conduct a local project review

DFSS Curriculum - Week 3

WEEK 3 - Specialty (DFSS only)

E-Learning Modules

BE-301	Intro to DOE (Maximizing ROI)

	Day 1	Day 2	Day 3	Day 4	Day 5
8:00	Intro, agenda Roadmap, Methodology	Recap, exercise	Recap, exercise	Recap, exercise	
8:30					
9:00	DOE Review	DOE Planning	Mandell's Method	SeaDOT	
9:30	Full Factorial Designs	Catapult Exercise	TRIZ		
10:00					
10:30					
11:00					
11:30					
12:00	LUNCH	LUNCH	LUNCH		
1:00	Full Factorial Designs, cont.	RSM	Reliability Engineering	Requirements Flowdown, Capability Flowup	
1:30					
2:00	Robust DOE			Requirements Management	
2:30					
3:00	DOE for Sigmas		Sensitivity and Monte Carlo	Confirmatory Testing	
3:30				Control Plan	
4:00					
4:30					
5:00					

Deliverables (prior to Week 2)

Complete the Week 2 Certification Exam (on-line)
Complete the E-Learning modules
Conduct a local project review



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