ISE 5810: INTEGRATED LEAN SIGMA FOUNDATIONS (BB w/Minitab Version of Foundational Training)

Course leads to a Black Belt Certificate (NOT CERTIFICATION)  Sp19 v3  15 Nov 2018

CLASS SCHEDULE:  Wednesday’s  08:00-11:40

CLASS LOCATION:  Enarson Classroom Building 018

INSTRUCTOR:  D. Scott Sink, Ph.D., P.E.

Office:  Baker 298

Home Office phone:  614 901 9732 (preferred if you are going to leave voice mail BUT e-mail is best mode)

Cell:  540 529 7190 (however, e-mail is the preferred mode of communication, I never pick up messages on my OSU office number and rarely answer or check messages on my cell phone, I use cell phone more for e-mail than phone)

Go2Meeting:  I have established a Go2Meeting account and do coaching calls using that app, it allows us to see each others’ screens and also provides a nice dial-in for multiple (up to 11) people to be on the same call and see same screen.

e-mail:  sink.22@osu.edu  (I have a secondary, home e-mail address, like your g-mail accounts, ssink@jumpcurves.com so don’t be surprised if you get e-mail from that address)

APPOINTMENTS:  I will be very responsive and available. E-mail me with a request to meet along with days and time slots that work for you and we’ll lock appointments into Outlook. I do not plan to hold office hours
as I don’t think that works well because 30+ candidates have such widely varying schedules. So let’s do it the way they do in real world and use Outlook to schedule appointments.

**Training Assistants for our First Two Labs (Assistant Coaches):**

1. TBD—they are candidates in 5811-12 that have successfully completed 5810.

**Alumni Subject Matter Experts (Associate Coaches and our Young Professionals Council):**

Our Department has created a Young Professionals Council, recent ISE Alum’s that were focused on the ILSS and Operational Analytics ‘track’ in ISE. There are some 25 of our Alum’s in this Council and they are all available to ‘mentor’ and on a limited basis just do some associate coaching.) The List is posted in Carmen, Admin folder with contact information.

**Intent of the Course:**

Provide an opportunity for ‘qualified’ students to obtain Black Belt Foundation (Ground School) Training that can lead to a Lean Sigma certification (Yellow, Green, or in rare instances Black Belt) in addition to their professional degree. Add an important additional offering for our OSU Engineering Students that is focused on developing ‘reduction to practice’ skill sets. Note that Lean Sigma certification is a ‘practice’ and ‘skill based competency’ certification. It’s about what you prove you know but more importantly about what you prove you can DO. Similar to getting a pilot’s license; there is ground school and a test but then there is flight school and the demonstration that you can safely fly an airplane. That’s a pretty good analogy for this training.
ALTERNATIVE PATHS THAT A CANDIDATE CAN TAKE:

1—JUST TAKE “GROUND SCHOOL” 5810: The candidate can just take the course work, earn a certificate for that and then, complete the project work for certification later. Having the orientation to Lean Sigma will be useful for most if not all ISE students. Certification levels build on elements like this foundational Course.

2—GROUND SCHOOL and FLIGHT SCHOOL SEQUENTIALLY: the candidate can take the course work, pass the exam, do an internship and LS project, then take ISE 5811/12 or 4900LS and use the capstone in the senior year as the second project leading to Black Belt Certification. This will take some planning and coordination with Dr. Sink but it is doable this way. Jared Frederici was the first candidate (in 3 years) to pull this off

3—GROUND SCHOOL AND FLIGHT SCHOOL CONCURRENTLY: The candidate can take ISE 5811 concurrent with 5810 and then take 5812 in the Spring and then upon REALIZATION of benefits on their project achieve Green certification. This could be followed by either an internship project (6 months) and then upon REALIZATION of benefits for that internship project they would achieve Black Belt Certification. Alternatively, the candidate might graduate post 5811/12 and do a project the first 6 months on the job and submit that to Dr. Sink for Black Belt Certification. Chris Bick is an example of someone who has done this, BSISE and GB Spring 2008, Black Belt project 2009, BB certified mid-2009.

Our intent is to design a lot of flexibility in terms of how a student candidate might achieve some level of certification.

PURPOSE AND OBJECTIVES: The course is the ‘ground school’ equivalent for obtaining an Integrated LeanSigma Green/Black Belt Certification from the College of Engineering and ISE at Ohio State University. The purpose of the course is to provide an opportunity for students to augment their professional degree with additional training and certification in the ‘field’ of Integrated LeanSigma (Business Process Improvement). The course work builds on, integrates the tools, methods and principles from the core ISE curriculum.
• Teach and train the Integrated Lean Sigma DMAICR (Define, Measure, Analyze, Improve, Control, Realize) methodology. Secondly, teach people how to modify the DMAIC methodology for problems, projects that are more Design for Integrated LeanSigma without having to understand Design for LeanSigma for Processes. (an underdeveloped area of certification in the real world)

  o Utilize case studies complete with real data sets to enable reduction to practice skill development for the tools and methods they have gained in the core curriculum;

  o Leverage ISE 5811-12 projects that are being done concurrently by a subset of the students as learning opportunities for all the candidates;

  o Utilize the blended training model (web-based curriculum, virtual coaching, reduction to practice training and coaching) as a way of exposing the student to state-of-the-art learning methods utilized in many businesses today;

  o Train the candidates on how to become good ‘cooks’ (follow the recipe), so that they can migrate, with practice, to become good ‘chefs’. The cook part comes in 5810, the chef part comes in 5811-12.

  o Leverage all the outstanding education that the students have received in their ‘core curriculum’ (e.g. Statistics, Operations Research, Production and Manufacturing Systems Engineering, Human Factors Engineering) and bring the principles, methods, tools of those areas to bear on process improvement methodology and projects.

• Continue to develop student’s competencies in professional presentation (written and oral):

  o Practice Toll-Gate preparation and delivery;

• Develop the student’s program and project management knowledge, experience, skill set;
- Utilized an industry standard program and project tracking system so that the candidates experience document control, deliverable management, etc.
- Focus on development the candidates ability to do Integrated Master Planning (program level) and also Integrated Master Scheduling (what you learned in 681)

- Continue to develop professional behavior and conduct;
  - Honor Code, Professional Ethics, Operating Principles, Ground Rules, the Importance of Values and Integrity
    - To include citing/giving credit, permissional use/copyright issues, benchmarking, academic versus real world differences
  - Continue to work on all five disciplines of high performing process improvement specialists (systems and statistical thinking, personal mastery, team learning and development, mental models, and creation skillfulness).

- Develop Communication Skills in a Professional Setting
  - Learn what information to communicate to various stakeholders, how to communicate the information and how often it needs to be communicated
CURRICULUM/LEARNING MATERIAL AND RESOURCES:

REQUIRED:

(Note: the ‘real value/cost’ of this training, comparable rigor and quality of program, ranges from $1,400 to $3,000. It would cost a company about $10,000 per candidate to provide this program. You will have an extra cost of around $500, see below, for this program. $350 is for the curriculum, another $100 for Minitab on your laptop, and then another $100 for supplemental materials.)

1--MoreSteam, Integrated Lean and SixSigma Black Belt Basic’s Curriculum. (this is web-based curriculum. Very comprehensive. Widely accepted as best in class e-learning curriculum. Dr. Sink will work with MoreSteam to ‘enroll’ the candidate in this training.

I sent an e-mail that provides the instructions for enrolling in the Moresteam Curriculum. You get a 1-year license, access. Coupon Code is OSUISE5810.
You will have to complete all of Moresteam, one pass through, complete detailed first pass before the first week of class. I’ll be sending weekly updates helping you manage pace.

MoreSteam.com contact information.

9976 Brewster Lane, Powell, OH, 43065

New phone: 614-602-8190
New fax: 614-602-8193

2—The Integrated Lean SixSigma Roadmap Rath and Strong Consulting. (out of print, I will have loaner copies of this for you to use in class)

3—Lean Six Sigma and MINITAB (Ring-bound) (probably not available in book store, will have to go to Amazon.com probably to get this. Very valuable resource!!--$60.00)
by Quentin Stephen Brook (Author) , 4th edition http://www.amazon.com/Lean-Six-Sigma-Minitab-4th/dp/095468138X/ref=sr_1_1?ie=UTF8&qid=1417861730&sr=8-1&keywords=six+sigma+and+minitab

Free 2-day shipping for college students from Amazon!! Need this for Second Lab!!!
4-- The Lean Six Sigma Pocket Toolbook: A Quick Reference Guide to 100 Tools for Improving Quality and Speed (Paperback) (Should be Available in the bookstore or on Amazon--$11.00) (not the little spiral bound thing, the paper back book)
by Michael L. George (Author), Need this for first class and Lab!!

5. http://www.lean.org/bookstore/productdetails.cfm?selectedproductid=9 Learning to see. I have requested this from book store, you can get them for around $25 in the bookstore behind Baker, get them at the front counter. I think they are $25.00 You will need this right away!! First class
6—Software/Productivity Tools:

a) **Statistical Analysis:** Minitab—the university has a site license but it can only be accessed on campus. If the candidate wants to have a personal copy of Minitab version 18, go to eAcademy--OnTheHub. (if you intend to do ISE 5811/12, then the annual rental would be best; if not, then the 6 month rental would work). This would allow you to use Minitab 18 where ever you are and would certainly be advantageous. You will need Minitab on your laptop and a laptop in every meeting.

And, the Fisher Program has licenses for Minitab’s Quality Trainer and has offered to allow you all to tap into that too if you so desire.

b) **Value Stream Mapping and Analysis:** Visio will be the primary app because it is a Microsoft app, standard, most companies have it. Looks better on resume to have deep knowledge in visio as compared to an app that many may not have heard of. However, I want you all to be aware that there are numerous Value Stream Mapping and Analysis specific tools out there, the one below is one we have used in past years (iGrafx) but I found students were not consistent at getting it or using it. It does have more features and functionalities than Visio.

a. **Simulation**—all students will be required to use Arena (or equivalent) to simulate their process and solution elements. We will not work with this in 5810 but you will be required to reduce to practice what you learn in the Simulation course on your projects. You have access to Moresteam’s Process Playground, see point c below.

b. **iGrafx Process for SixSigma** ($49.00 1-year student license). This version gets you DOE and Simulation which will be potentially useful. E-academy has discounted versions of this too. [http://e5.onthehub.com/WebStore/ProductSearchOfferingList.aspx?ws=49c547ba-f56d-dd11-bb6c-0030485a6b08&vsro=8&srch=igrafx](http://e5.onthehub.com/WebStore/ProductSearchOfferingList.aspx?ws=49c547ba-f56d-dd11-bb6c-0030485a6b08&vsro=8&srch=igrafx)

c. **MoreSteam’s Process Playground.** We will be doing some beta testing for MoreSteam this quarter with a high level, discrete event simulator as part of our Lean Lab.
c) **Program and Project Management:** You will be required to do both program and project management:

a. For **Program Management** you will be required to practice a method used by NASA and Boeing and others called **IMP, Integrated Master Program/Plan.** This IMP then links to the IMS—Integrated Master Schedule which is what you are taught in your project management course, see next ‘app’. Mastering Program Management/Planning is a critical skill in executing real world projects.

b. For Project Planning and management, we will use the standard MS Office applications to include **MS Project.**

c. MoreSteam’s Project Tracking System called **TRACtion** (webbased, no cost to students enrolled in ISE 5810. You will be enrolled in this once you start your projects.) This will be good practice for you in terms of using an enterprise level program/project tracking tool.

7—**iSixSigma Website.** iSixSigma isn’t published anymore but the website is back and active now. I have posted pdf copies of Final Tollgates from that past journal in Carmen, read through those. I have hard copies of the magazine in my office. Quality Progress is probably the next best journal for you to stay current with, ASQ’s journal.

http://www.isixsigma.com/

8—**The Fifth Discipline by Peter Senge.** I have loaner copies of this for all of you if you want to do it that way or you can get them cheap at Amazon.com and have your own copy. Borrowing one from me is fine; I have enough for everyone. Some of you may need to practice Systems Dynamics Modeling on your projects.

9—**The Enterprise Value Map**—order from this site (http://www.deloitte.com/view/en_US/us/Services/additional-services/driving-enterprise-value/39a80fa75200e110VgnVCM100000ba42f00a9CRD.htm) Get 5, free, and then give me 2 or 3.

10—since we are in the newly renovated lab but not a computer lab, you will NEED to have a laptop and wireless connection activated so you can get into Carmen and MoreSteam course real time in class!!!
THESE ITEMS ARE REQUIRED BY THE FIRST DAY OF CLASS AT THE LATEST. IF YOU OBTAIN THESE MATERIALS BEFOREHAND AND REVIEW THEM YOU WILL SET YOURSELF UP FOR SUCCESS.

OTHER:

Dr. Sink will provide ‘favorite’ reads (articles, books, etc.) as the course goes along and you are welcome to pursue those leads. He has a library of great books that you can borrow from.

OTHER DEVELOPMENT READINGS YOU MIGHT BE INTERESTED IN AND ARE SALIENT:

1—Stephen Covey, *The Seven Habits of Highly Effective People* and *First things First*.
2—Jim Collins, *Built to Last* and *From Good to Great, Great by Choice*
3—Robert Fritz, *The Path of Least Resistance*
4—David Garvin, *Managing Quality*
5—W. Edwards Deming, *Out of the Crisis*
6—Akao, *Hoshin Kanri, Policy Deployment for Successful TQM*
7—Goldratt, *The Goal*
8—Wheeler, *Understanding Variation*
9—George, *Lean Six Sigma for Service*
10—Imai, *Kaizen*
11—Hamel, *Kaizen Event Fieldbook*
12—Likert and Maier, *The Toyota Way Fieldbook*

13—Womack, *The Machine that Changed the World*

14—Senge, *The Fifth Discipline Fieldbook*

15—Senge, *The Dance of Change Fieldbook*

16—Garvin, *Managing Quality*

17—Feigenbaum, *Total Quality Control*

18—Hammer, *Reengineering the Corporation*

19—Harry, *Six Sigma*

20—Something on Design for Lean Sigma

21—Kilmann, *Managing Beyond the Quick Fix*

**Activities/Experiential/Skill Development:**

1—Tollgate Preparation, Versioning, Delivery Skill Development: some candidates will be 'in flight' concurrent with 5810 and we will leverage this in a case study fashion to prepare all candidates for this critical skill set. All candidates will gain practice with preparation of TG’s as an integral part of the Lab Simulations.

2—Final Tollgate Report (through implementation and realization stages)—It will likely not be the case that in the ISE 5810 Basics course, 15 weeks, any projects get to the Final Tollgate and hence Dr. Sink will provide case study examples of what the Final Tollgate looks like, and what the requirements are.
**3—Lean Sigma Simulations**—there are a number of Lean Sigma ‘simulations’ that are integral to Foundation training and these will be integrated into the training schedule: *NOTE: THESE LABS/SIMULATIONS TAKE PLACE ON EITHER A SATURDAY OR SUNDAY. THEY ARE SPACED OUT OVER THE FIRST 7 WEEKS. IN THE FALL THEY AVOID A HOME GAME. THEY ARE REQUIRED/MANDATORY. IF YOU MISS ONE FOR ANY REASON, YOU WILL NEED TO DROP THE CLASS, THEY CANNOT BE MADE UP AND SIMPLY CANNOT BE MISSED.*

*ALSO, cannot miss any meetings and still earn a certificate. Perfect attendance is required for certificate.*

**LAB I—LEANSIGMA SIMULATION**—‘stickle-brick’ lean simulation. ~6 hours in length. Will be held during our first Saturday Lab that is typically after the second training session. It’s fun, and gives the students a complete experience of what a process improvement project looks like from D to Implementation/Realization as well as the throught process to execute it.

**LAB II—LEANSIGMA SIMULATION**—‘statapult’ is the classic simulation utilized for this and this will be also incorporated. This gives the students/candidates a chance to actually experience process capability measurement and also to practice DOE. The DOE portion of this simulation is augmented with a web based simulation. Minitab is utilized as the ‘productivity’ tool. This will be our second Saturday Lab and is typically the Saturday after our 3rd or 4th training session.

**LAB III—CHANGE LEADERSHIP AND MANAGEMENT LAB**—Successful implementation and sustainable improved process capability is the ultimate measure of success for an ISE/LS project. Encountering any number of roadblocks, obstacles, land mines, etc. is inevitable, some are technical in nature (e.g. lack of data) some are people in nature. The Third Lab focuses on implementation strategies for Industrial and Systems Engineers.

**LAB IV—Operational Analytics. Hypothesis Testing, Confirmatory Data Analysis, Minitab, Exploratory Data Analysis. Use of multiple real data sets to develop OA skills.**
LAB V—SIGMA BREW ($50 OF YOUR $350 TO MORESTEAM IS FOR THIS) - THIS WILL GIVE YOU EXPOSURE TO MAKING DECISIONS INCLUDING WHERE AND HOW TO UTILIZE RESOURCES TO CARRY OUT A PROJECT, CARRYING OUT ANALYSIS UTILIZING TOOLS FROM 5810, EXPERIENCE WITH P&P UPDATES (AN EXTREMELY VALUABLE USEFUL TOOL WHEN LEARNED AND EXECUTED PROPERLY), PROJECT MANAGEMENT AND ADDITIONAL TOLLGATE EXPERIENCE.

4—PERSONAL AND PROFESSIONAL MASTERY. Peter Senge presents five disciplines that people in high performing organizations need to master, personal mastery is one. Dr. Sink will weave the other four disciplines that augment systems and statistical thinking into the training over the quarter.

a. Ideal Learning Behaviors (logbooks, effective listening, ground rules, focus, etc.)
b. Creation Skillfulness
c. Communication Skills
d. Responsiveness, business at speed of thought
e. Trust
f. Feedback
g. Competition and Cooperation, team work
h. Mindset, intentionality
i. Listening skills
j. Defensive routines
k. Getting out of comfort zone
l. S-shaped curves, how to take charge of development and growth
m. Professional modes of functioning, 6 Thinking Hats, MBTI, etc.
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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Activity (illustrations)</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>Winter Break</td>
<td>Pre-work needs to be completed prior to first class 9 Jan</td>
<td>Start studying through Moresteam, pace yourselves</td>
<td>Study Sessions 1-9 and 12 and 13 in Moresteam, complete, first pass, to be ready for Lab I</td>
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<tr>
<td>Wk 1a: 9 Jan</td>
<td>Course Overview, Operational Excellence, Intro to Quality and Productivity and Integrated Lean and SixSigma in context of ISE</td>
<td>Intro to LS and the course; Roadmap Work, contextual overview, examples of some better projects to give you a DONE perspective, Tee Up Lab I--LEANsigma</td>
<td>Read at least 2 Final TG articles from Carmen</td>
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<tr>
<td>Wk 1b: 12 Jan (Sat)</td>
<td>Lab I—LEANsigma Simulation (8:30-4 pm) Baker 1st floor (TBD)</td>
<td>Physical, Experiential Simulation of Lean Concepts and Principles</td>
<td>Pre-study—you should be done with Moresteam Sessions 1-9 and 12 and 13 before this Lab!</td>
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<tr>
<td>Wk 2: 16 Jan</td>
<td>DEFINE Stage: Picking right projects, Value Stream Analysis, Voice of Customer and Business. Preparing for Tollgates. Tollgate management.</td>
<td>Define Tool Practice, preparing Define TG, Review D and M TG’s from Lab I</td>
<td>We’ll be focusing on Sessions 1-5</td>
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<td>Wk 3: 23 Jan</td>
<td>DEFINE to Measure Transition</td>
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<td>Study Sessions 10 and 11</td>
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<tr>
<td>Wk 4: 30 Jan</td>
<td>MEASURE: Intro to Measure Stage</td>
<td>Review of Measure TG’s from actual projects, more work from Lab I, Measurement Plans, work with VSM and VSA, Measurement Systems Analysis</td>
<td>DONE with all of Measure and headed into Analyze in Moresteam and Blue Book, Session 10 and 11 will be utilized extensively in Lab II!!!!</td>
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<tr>
<td>Wk 4a: 2 Feb</td>
<td>Lab II—leanSIGMA Simulation (8:30-4pm) Baker 1st floor</td>
<td>Physical Hands-on Simulation of Six Sigma Concepts and Principles and Tools</td>
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<tr>
<td>Week 5: 9 Feb</td>
<td>Measure: Charting Process Behavior, understanding Process Capability</td>
<td>Working with Lab II</td>
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<tr>
<td>Wk 6: 16 Feb</td>
<td>Measure continued and Analyze</td>
<td>Exploratory Data Analysis, Measurement Planning, Process Capability, Practice</td>
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<td>Wk 7: 23 Feb</td>
<td>Analyze I: Root Cause Analysis</td>
<td>EDA c</td>
<td>Study Session 11</td>
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<tr>
<td>Wk 7b: 2 Mar</td>
<td>Lab III—Soft Skills</td>
<td>Workplace Competencies, Soft Skills, Personal and Professional Mastery, Other Four Disciplines, Change Leadership and Management</td>
<td>A wide array of outside readings and activities</td>
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<tr>
<td>Wk 8: 6 Mar</td>
<td>Analyze—begin Lab IV</td>
<td>Confirmatory Data Analysis Practice</td>
<td>All of Moresteam, sessions 1-12 should now be completed</td>
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**Spring Break (11-15 March)**
<table>
<thead>
<tr>
<th>Week 9: 20 Mar</th>
<th>Lab IV</th>
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<tbody>
<tr>
<td>Week 10: 27 Mar</td>
<td>Lab IV</td>
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| Wk 11: 3 Apr | Lab 3 Continuation + Analyze II: CDA work  
Launch Sigma Brew, Lab V |
| Wk 12: 10 Apr | Analyze III: CDA and A to I transition  
Launch Lab V—Sigma Brew Dm DOne |
| Wk 13: 17 Apr | Lab V—Ma Done |
| FINAL: 23, 24, 25 Apr | Final Exam (Moresteam) |

| | Continue to work with abstractions, practice CM tools, plus CDA data set work |
| | Confirmatory Data Analysis and A to I transition |
| | Stage Gate meeting Practice |
| | This is your comprehensive written exam that is required for your LS Basics Certificate (not GB certification but the foundation requirement for GB certification) You need a 5 hour chunk of time, I will book lab space for this, set aside space, you will need two screens to work with. |
| | Session 2 of MS is their material on this subject and Session 10 Moresteam |
| | ANALYZE Session 10 Moresteam completed |
| | FINAL EXAM Windows will be week of 22nd of April |
**Performance Development and Evaluation** (this ‘rubric’ is subject to enhancements as the quarter progresses: (140 points to earn a 100)

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<tr>
<th>Assessment Component</th>
<th>Weighting</th>
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<tr>
<td>Labs I and II—Lean and Six Sigma Principles and Methods</td>
<td>30%</td>
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<tr>
<td>Lab IV—Operational Analytics Reduction to Practice Work (EDA and CDA) and other pre or post work assignments</td>
<td>25%</td>
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<tr>
<td>Lab III—Change Leadership and Management</td>
<td>20%</td>
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<tr>
<td>Mini-Tests (from Moresteam to confirm how well you did you pre-study work) spaced out over entire semester</td>
<td>15%</td>
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<tr>
<td>Lab V—Sigma Brew: Capstone DMAIC</td>
<td>15%</td>
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<tr>
<td>MoreSteam Quizzes</td>
<td>5%</td>
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<tr>
<td>MoreSteam Final Exam</td>
<td>30%</td>
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**FINAL EXAM AND CERTIFICATE:**

The Final Exam is a comprehensive, 5-hour, on-line exam that is the equivalent (it's actually better in my view) to the ASQ BB exam. It is multiple choice BUT there are numerous data set questions, questions that have data sets, require analysis to answer the questions. The lower spec limit is 80%. The exam is held in the ISE computer lab on the 3rd floor, reserved space, is held over a three day period to provide students options on when they take and is proctored. It is open book, open notes, open mind.

The Certificate is earned based on successful passing of the exam at the 80% level or higher AND also successful performance against the other 70% of the overall course rubric. **One might pass the exam and fail other critical dimensions of the course and not earn the Certificate.** The Certificate Decision is based on overall course performance, to include the final exam.
OTHER ADMIN ITEMS:

Honor Code and Policy:
Personal and Professional Mastery/Development is a core component of this class sequence (5810, 5811-12). The importance of Values and Operating Principles will be emphasized at many times in the class. OSU, like most organizations, has requirements and expectations regarding professional conduct of students and these apply in this class. I provide several links to what I consider to be outstanding Honor Code's that I’d like you to review before the first class:

1-- OSU School of Medicine: http://medicine.osu.edu/students/life/resources/honor_code/Pages/index.aspx

2—Virginia Tech UG Honor Code (note TRUST) http://www.honorsystem.vt.edu/

3—OSU’s overall Code of Conduct http://fye.osu.edu/PDF/Orientation/policies.pdf

Creating a Culture and Conditions for Success for All Students:

This is a blended training model and we are also focused on helping students (all students) understand how individuals, groups and organizations achieve and sustain full potential performance. As such, there is a focus on making Values and Operating Principles explicit, transparent and also on working with them regularly. Students are encouraged to ask clarifying questions, to take advantage of Dr. Sink and the resources he provides to support success. Dr. Sink is open to feedback at all times, encourages it and, is totally committed to the success of each and every student in these classes.
The IMPORTANCE OF LEARNING HOW TO TAKE COPIOUS NOTES: GET AN ENGINEERING NOTEBOOK: THE ENGINEERING NOTEBOOK

David G. Green and David A. Conner

INTRODUCTION

The purpose of this document is to describe the Engineering Notebook and present rules for its proper usage. Properly done, the Engineering Notebook can prove to be one of the most effective tools in the Engineer's (or Engineering Student's) tool-kit. It can resolve disputes of memory, serve as repository of decisions and justification of same, and provide information useful in estimating required effort on future projects.

PURPOSE: RECORD OF DEVELOPMENT - DIARY

The purpose of an Engineering Notebook is to document in written form the efforts of its author on one or more projects in a time-sequential form. It is the equivalent of a technical diary. The Engineering Notebook contains (among other things)

- the ideas of its author,
- the alternatives considered,
- decisions reached,
- interactions with other people and with organizations,
- the changes made along the way, and
- the implementation flow of projects, labs, etc.

RULES
The Engineering Notebook is to be a permanent record for purposes of reference, growth of the engineer, defense, and completeness. As such, it must be provable that things are recorded in a consistent, timely, orderly manner. The written record must be in permanent ink and in a book where the pages and their order cannot be changed. Usually, Engineering Notebooks consist of specially manufactured bound books with pre-numbered pages. All entries should be dated, and no large blank spaces should be within the used portion of the notebook. If it is desired to skip to another page, then the blank space should be lined out in ink. Often, it is advantageous to record other details such as time of the entry, who one talked to, and amount time expended on the effort.

One should attempt to record everything of any possible relevance in the Engineering Notebook. It is impossible to prejudge the importance of small details in the middle of the project. Without a mind-set to record everything, significant items will be missing from the record.

Significant printouts, memos, and other items may be taped into the Engineering Notebook in the order received with handwritten dating and titling to substantiate their entry. Project Binders can also be used to track and file documents by topic and time to have an up to date reference on data, information on the project as well as project deliverables.

Errors in the written record are corrected by making additions to the notebook in the proper sequential location of the Engineering Notebook explaining the previous errors. It is legitimate to make a small, dated notation near the error referencing the later page(s) where the correction is located.

**Taking Data (Copious Note Practice)**

The most important activity regarding the Engineering Notebook is the recording of information. If one does a poor job of data recording, then all other uses of the notebook are diminished. One must maintain a mind-set whereby all data is immediately, accurately and completely recorded in the Engineering Notebook.

If in recording information or ideas an error is made, strike out the error with a single line through it. Sometimes, the idea was useful after all. The errant data might be valuable in some (presently) unknown context.
One should consider what the organization (if any) of the information is, and if appropriate, construct a table. If the concept of a table or other format occurs after data collection, simply add the table to the present input location of notebook and add cross-referencing information.

Finally, one should consider sketches a valuable method of documentation. Include sketches showing equipment setups, maps to desired destinations, location of special switches, etc. in the engineering notebook so the information can be retrieved at a later date.

**EXTRAS**

This section includes some tested ideas for effective use of the Engineering Notebook in various environments. One should feel free to pick and choose and/or modify and adapt these techniques for their own use.

Log questions as they occur. Use an unfilled-in symbol like a circle, triangle or diamond in the margin to mark these items. When these questions are resolved, color in the symbol. To-be-done items can also be accommodated in this manner. One of the authors uses this scheme to mark the names of computer files which have been modified but not (re-)printed.

It is legal to reserve (by specially marking) the first pages of the Engineering Notebook for an index, for key telephone numbers, etc. Some Engineering Notebooks are pre-marked with some of these useful items. While one may index the notebook after the journal is full, the authors find it more useful to keep a running index of important items as the notebook is being used.

Consider using backward and forward references to track items throughout the log. One of the authors places a page and section reference in upper left-hand corner of a section (size of a page or less) referring to the most recent previous entry on the same subject. In the bottom right hand corner, the author will enter the next reference to the same subject when it occurs. This entry is made when the upper left-hand corner cross reference of the new section is made.

**STYLES**

There are many styles of engineering notebooks. The critical features of the Engineering Notebook have already been discussed. Bound notebooks come in many sizes, with different markings, and with and without pre-numbered pages. The notebooks without numbered pages must be immediately hand-numbered in ink to be acceptable as engineering notebooks. The two most
popular sizes are 5 by 8 inches and the larger 9 by 11.5 inches. Both of the authors prefer the larger notebook format allowing more information (and full text sheets) on a single page over the smaller, easier to carry style.

**Potential Sources**

There are several vendors of acceptable notebooks. The following links are furnished as a convenience to the reader.