CHIP 490 - Quality Improvement Data Visualization in Healthcare

In this course students will learn the basic concepts of quality improvement and Lean Six Sigma with special emphasis on healthcare applications. We will use many examples from the Institute for Healthcare Improvement, leading hospitals, and other healthcare organizations. This course is about Statistical Engineering and a systematic approach to problem solving (Lean Six Sigma philosophy (DMAIC) for improving healthcare, manufacturing and business processes using advanced graphical and statistical models. Defining the improvement opportunity, measurement system analysis, data collection, statistical analysis, design of experiment (DOE) methods, and statistical process control (SPC) methods. Applications of statistical engineering to business and manufacturing case studies. Students will get hands on experience using data analysis tools with the focus on JMP Pro software. The course includes a project prototyping using JMP Pro software for data Analysis.

Course Objectives

By the end of the course the student will be able to:

- Explain and apply statistical and systems engineering using multiple graphical and statistical tools using state-of-the-art graphical and statistical software to improve business and manufacturing processes
- Formulate problem statements that identify critical quality improvement opportunities,
- Deploy Lean Six Sigma methodology (DMAIC) to solve challenging engineering and business management problems using graphical statistics, measurement systems analysis, process capability studies, hypothesis testing, the elements of Design of Experiments (DOE), and Statistical Process Control (SPC), and other methods
- Interpret and explain graphical and statistical results from state-of-the-art statistical software (JMP) for making engineering and business decisions, and
- Develop organizational improvement plans to address critical issues.

**Time:** Tuesday 2:00pm ET –4:45pm ET  
**Location:** online  
**Credits:** 3 Hours  

Spring Semester 2024
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Office Hours: send me an email anytime you need me.
Email: johnger@unc.edu (best way to contact me)

Course Outline
- Introduction to Quality Improvement and Lean Six Sigma
- DMAIC
- Introduction to JMP Pro
- Learning about JMP Pro Features
- Data Analysis using JMP Pro
- Visual Presentation

Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date Monday</th>
<th>LECTURE TITLE</th>
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<tbody>
<tr>
<td>1</td>
<td>1/16</td>
<td>Course Introduction, Introduction to Quality Improvement, Introduction to JMP Pro.</td>
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<tr>
<td>2</td>
<td>1/23</td>
<td>Overview of Lean Six Sigma, Define Phase</td>
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<tr>
<td>3</td>
<td>1/30</td>
<td>Voice of Customer, Lean Six Sigma Teams, Core Tools, Core Lean Tools</td>
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<td>4</td>
<td>2/6</td>
<td>Introduction to Process and Measure</td>
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<td>5</td>
<td>2/13</td>
<td>No Class</td>
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<tr>
<td>6</td>
<td>2/20</td>
<td>Measurement System Analysis</td>
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<tr>
<td>7</td>
<td>2/27</td>
<td>FMEA and FMECA Benchmarking</td>
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<td>8</td>
<td>3/5</td>
<td>Midterm</td>
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<tr>
<td>9</td>
<td>3/12</td>
<td>No Class</td>
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<tr>
<td>10</td>
<td>3/19</td>
<td>Probability and Statistics</td>
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<tr>
<td>11</td>
<td>3/26</td>
<td>Introduction to Analyze</td>
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<td>12</td>
<td>4/2</td>
<td>Correlation And Regression</td>
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<td>13</td>
<td>4/9</td>
<td>Design of Experiment</td>
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<td>14</td>
<td>4/16</td>
<td>Error Proofing and Introduction to Control</td>
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<tr>
<td>15</td>
<td>4/23</td>
<td>Project Workday</td>
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<tr>
<td>16</td>
<td>4/30</td>
<td>Project Presentations and Project Submission</td>
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<tr>
<td>17</td>
<td>4/30</td>
<td>Final Exam</td>
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Spring Semester 2024
Canvas: We will use Canvas (https://edtech.unc.edu/service/canvas/) in this course to submit assignments, return grades, share lecture notes, provide access to assigned readings and other class resources.

Course Project:
- Pick a project related to your work
- Identify and Define problem you're trying to solve
- Define your mission to solve the problem
- Brainstorm the potential causes
- Improvement and cost saving
- Use JMP Pro Software to analyze your data
- Present project.

Grading
Your grade for this course will be based on the quizzes, assignment, exams, course project and class participation. The approximate breakdown within those categories is as follows:

HOMEWORK: Weekly Assignments and in-class quizzes (20%).

EXAMINATIONS: One midterm exam (25%), and one exam during finals week (25%)

PROJECT: Apply the skills you learned in this course to a project selected by your team (30%). Details on the project requirements will be provided in the third or fourth week of class. If you have personal suggestions for projects, please provide those to the class instructors as soon as possible.

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<thead>
<tr>
<th>Points</th>
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<tbody>
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<td>94&gt;</td>
<td>H</td>
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<tr>
<td>75-94</td>
<td>P</td>
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<tr>
<td>65-74</td>
<td>L</td>
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<tr>
<td>&gt;65</td>
<td>F</td>
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Course Policies and Expectations

Communications
- **Course announcements** will be posted on Canvas. Announcements may include information about the week's work, or other timely information.
- **Email** is the best way to contact me.
- **Virtual Office**: for any kind of questions about course, assignments, etc. you can send me an email including your questions. I will answer your questions through email or set up a zoom meeting based on your preference.

Email Policy:
All faculty members receive a large amount of email. For a quicker response, **be sure to include the course name in the subject line**. If you asked a question and do not get a response within three business days, then you may need to send a reminder (with the course name in the subject line!).

Class preparation is key to getting the most out of each class. You are expected to come to class having completed the readings from reading assignment and other resources linked from the class schedule in Canvas.

Assignment Submission
All course project deliverables are to be submitted via Canvas by the start of class on the day they are due. For group projects, only one member of the team needs to submit on behalf of the group.

SOFTWARE REQUIREMENT

Each student must have or have access to a laptop computer with JMP Pro Software, MS Word and Excel, a browser, and e-mail. You can download JMP Pro for free. The software will be extensively used in this class.
Academic Integrity and Diversity
UNC-Chapel Hill has had a student-administered honor system and judicial system for over 100 years. Because academic honesty and the development and nurturing of trust and trustworthiness are important to all of us as individuals, and are encouraged and promoted by the honor system, this is a most significant University tradition. You are responsible for being familiar with the UNC-Chapel Hill Honor System.

The UNC Honor Code is in effect for all work in this course. Section II. B. of the Instrument of Student Judicial Governance gives examples of actions that constitute academic dishonesty.

In support of the University's diversity goals and the mission of the School of Information and Library Science, SILS embraces diversity as an ethical and societal value. We broadly define diversity to include race, gender, national origin, ethnicity, religion, social class, age, sexual orientation and physical and learning ability. As an academic community committed to preparing our graduates to be leaders in an increasingly multicultural and global society we strive to:

- Ensure inclusive leadership, policies, and practices
- Integrate diversity into the curriculum and research
- Foster a mutually respectful intellectual environment in which diverse opinions are valued
- Recruit traditionally underrepresented groups of students, faculty, and staff; and
- Participate in outreach to underserved groups in the State.

The statement represents a commitment of resources to the development and maintenance of an academic environment that is open, representative, reflective, and committed to the concepts of equity and fairness.