OM5093 Special Topics
TPS Lean Kaizen Projects

Objectives and Description: This Special Topics class, delivered in field-study format, is designed to teach participants the Toyota Production System (TPS) using a learn-together-by-doing protocol. The course will cover TPS principles and its philosophical, managerial, and technical approaches to improvement – continuously striving to find better ways of doing things. One vehicle for learning will be team-based Process Improvement (PI) or Kaizen projects with local firms. The course is motivated by collaborations with TSSC (Toyota Production System Support Center, http://www.tssc.com), a not-for-profit arm of Toyota Motor Engineering & Manufacturing North America, Inc. Note that all usage of the term Toyota Production System and TPS is generic and refers to public domain knowledge; it is not intended to reveal Toyota’s proprietary system. The academic basis of this course is the TPS framework, it’s application in manufacturing and service environments, and the theoretical framework for operations strategy and change management.

Upon successful completion of this course, participants should be able to:

1. Explain the linkage between customer satisfaction and wastes in the workplace,
2. Apply the TPS Lean analysis to any business operation,
3. Select and use the correct TPS Lean tools in a business setting,
4. Analyze processes to identify problems and develop solutions to improve performance,
5. Work through a specific Process Improvement problem from problem definition through recommendations using a well-structured problem solving process,
6. Design and manage a multi-disciplinary team for performance improvement.

The course contains two set of learning opportunities: A) Interactive class lectures / discussion / readings / exercises / plant tours on TPS / Lean / Six-sigma topics and tools. While the course focuses on TPS Lean terminology, some parallels with related six-sigma quality improvement approaches such as PDCA / DMAIC will be discussed. B) Learn-by-doing site visits by student teams to go-and-see the kaizen work environment, identify background / problems, current situation, goal, analysis of root causes, proposed countermeasures, implementation, potential results (8-step problem-solving approach). This course structure combines TPS topics and tools with hands on project work and necessitates independent learning on-demand, team coordination, and some flexibility / dynamism in the course schedule and project work (expect changes to the course schedule and expect project work to be dictated by the site, so be prepared – e.g., workload may not be spread out evenly over the semester; site visits may not be of short duration, e.g. 3:30 – 4:50 PM).

Initial TPS topics will cover a historical overview, foundational elements to bring stability to a process, then discuss ways of identifying non-value added waste and taking steps to achieve higher levels of productivity, profitability, and professionalism of the workforce. Useful tools such as value stream mapping (a.k.a. material and information flow chart at Toyota), 8-step lean A3-sheet methodology, will also be highlighted, along with illustrative examples and references. Once the team-based projects start, one class each week will be devoted to covering TPS course materials: concept and implementation. The second class is a placeholder for on-site visits, team project work, and project milestone / progress presentations (which also will provide opportunities for all teams to learn from the efforts of other teams thru’ periodic information exchange including the mid-
semester project update presentation). Teams will be expected to schedule regular site visits either during one of the weekly class-time slots or during an alternative time that is convenient for the team and the project site. It is important for members of each team to either have roughly the same schedule or a flexible schedule so they can arrange a common site visit time slot or have extra members so a subset can participate in site visits while they document each site visit for the team. In addition to the 3 hours of class time per week, you should expect to devote an average of at least 6 hours each week on project work outside of class time. Part of this time may be used to meet with the instructor / teaching assistant who, along with the site coach will play the role of project mentor / facilitator, help resolve problem issues, and guide the team to continue to make progress on their project charter.

Other notes on team field studies projects include:
- Projects with local organizations involve an inherent element of lack-of-structure, uncertainty, and diversity across projects and time.
- Make your recommendations for Process Improvement (PI) with sensitivity to the cultural context
- Understand that any PI initiative is a complex exercise in change management
- While we plan to implement changes and measure outcomes, this may only be possible for some projects and not for others. The key idea is to share experiences of different teams as a mechanism to learn more about the Toyota way of operation and the varied elements that help a TPS lean organization excel.

Course Materials: (i) This is a new course being piloted, (ii) the instructor is still learning TPS, and (iii) there are no great “textbooks” on Lean as TPS is learned by doing with a coach / mentor. So, over the semester, materials for this course will be added to Blackboard, https://canopy.uc.edu, especially over the first few weeks. Some information on TPS Lean can be obtained from the web (a list of links will be provided on Blackboard via a Google doc and students are invited to add to these links, especially for sources specific to certain sectors such as healthcare, service, IT, or not-for-profit). Good general references on TPS / Lean include:
2. *Learning to See* – Value Stream Mapping to create value and eliminate muda, 1999, Lean Enterprise Institute, Mike Rother and John Shook.
Follow-up Books: (An Exec Summary of the 14 principles will be posted on Blackboard.)
*Toyota Kata* – Managing People for Improvement, Adaptiveness, and Superior Results, 2010, McGraw Hill, Mike Roth
3. Lean Websites: e.g., Lean Enterprise Institute: https://www.lean.org; Continuous Improvement and Six-sigma: https://www.moresteam.com/index.cfm (e.g., see their resources at https://www.moresteam.com/resources.cfm, in particular the DMAIC toolbox).

Course Standards / Assessment: The tentative scheme is as follows (further details TBA):
10% Initial / Basic Lean Assessment: Take quiz at http://www.toyota-global.com/company/vision_philosophy/toyota_production_system/quiz_on_the_toyota_production_system.html (needs Flash Player). Note your individual score (store a pdf or other image for your records).
Read material at http://www.toyota-global.com/company/vision_philosophy/toyota_production_system/ (click & read thru’ the sub-items on the right under Toyota Production System including JIT, Jidoka, Origins of TPS, TPS Illustration). Retake quiz if previous score was below 70%

The hands-on Kaizen project is to be worked on regularly. Teams are encouraged to meet with the instructor or teaching assistant each week to discuss past progress on project work or future plans. Meetings may be replaced by a weekly project update document, if the project is making good progress. Note that good
progress is measured by how much you will exceed the project client’s expectations. There will be three project milestones requiring submission or presentation:

1. Project Charter – due a week or so after your first site visit.

10% Initial Engagement Contract / Project Charter
20% Mid-semester Project Presentation – include any TPS tools used such as VSM / A3.
30% Final Project Presentation
10% Professionalism, Teamwork (Peer & Mentor Evaluations)
10% Individual Course Reflection / Lessons Learned / Kaizen the Course (or exit quiz)
10% Class Participation

Notes: Teamwork is an important determinant of success in this course: If any problems crop up in team work, please contact the instructor or teaching assistant ASAP so they may be more successfully addressed. At the end of the course all course participants, mentors and instructors will be required to evaluate the participation and contributions of all team members that they worked with. Your team’s performance in the Final Presentation and your individual performance in Peer, Mentor, and Instructor Evaluations will impact your overall course score.

Instructor reserves the right to change the above assessment with advance notice. E.g., an exit knowledge review / quiz or specific assignments may be added, if project work does not progress as anticipated. Although, we have sought projects to accommodate all students, in the unlikely event that we are unable to place all teams in a local organization, this Special Topics class will be converted for some teams into a research paper on TPS Lean focusing on topics selected by the Instructor. Finally, if groups of students do brief in-class presentations, these presentations will be factored into the student’s course score.

### Tentative Course Syllabus / Timetable:

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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings / Deliverables</th>
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<tbody>
<tr>
<td>Week 1: Jan 10, 12</td>
<td>Course &amp; Projects Intro; TPS Overview – History, Philosophy, Basic Thinking, Lean Principles Tools: PDCA / DMAIC / 7-step</td>
<td>Form Teams; Take Toyota Global Initial Lean Quiz Read Toyota Way: 14 Principles Exec Summary (Bboard)</td>
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<td>Week 2: Jan 17, 19</td>
<td>Stability, Jidoka, Continuous Flow, Project Details – Clarify the Business Need / Problem, Tools: 8-step / A3 Report</td>
<td>Match Teams with Projects Read Toyota’s Secret: The A3 Report, SMR 2009 See Web / Bboard for 8-steps</td>
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<td>Week 3: Jan 24, 26</td>
<td>Visual Control, 5S, Standardized Work, Pull System, Heijunka</td>
<td>Initial Project Site Visit Youtube Basic Technical Tools by Jacob Isaac-Lowry, e.g., <a href="https://www.youtube.com/watch?v=KP6wLw1jhzA">https://www.youtube.com/watch?v=KP6wLw1jhzA</a></td>
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<tr>
<td>Week 4: Jan 31, Feb 2</td>
<td>Project – Break down the Problem; Stability, Waste / Value Stream Map</td>
<td><strong>Finalize Project Charter</strong></td>
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<td>Week 5: Feb 7, 9</td>
<td>Metrics, Target Setting &amp; Root Cause Analysis – 5 Whys</td>
<td>TBD</td>
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<td>Week 6: Feb 14, 16</td>
<td>Brainstorming Countermeasures using Standardized Work, Jidoka</td>
<td>TBD</td>
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<td>Week</td>
<td>Dates</td>
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<td>7</td>
<td>Feb 21, 23</td>
<td>Change time-frame; People Development; Managerial Practice &amp; Soft-side of TPS</td>
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<td>8</td>
<td>Feb 28, Mar 2</td>
<td><strong>Mid-semester Project Presentations</strong></td>
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<td>9</td>
<td>Mar 7, 9</td>
<td>Implementing Countermeasures; Advanced Problem Solving</td>
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<td>Mar 14, 16</td>
<td>Spring Break</td>
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<td>10</td>
<td>Mar 21, 23</td>
<td>Monitor Results &amp; Processes</td>
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<td>11</td>
<td>Mar 28, 30</td>
<td>Transformation: Sustaining and Improving TPS Culture of Change</td>
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<td>12</td>
<td>Apr 4, 6</td>
<td>Focus Exclusively on Project Work – meet with instructor / TA / mentors</td>
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<td>13</td>
<td>Apr 11, 13</td>
<td>Discussion of Key TPS Lessons</td>
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<td>14</td>
<td>Apr 18, 20</td>
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<tr>
<td>15</td>
<td>Apr 25, 27</td>
<td>Finals Week</td>
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This timetable may be modified as the course progresses to possibly include a Toyota Plant Tour; guest speakers. The TBD in the table above is an experiment in Blended Learning. Groups of students could use some of the class time to do a short in-class presentation on the topic of the day as a means to provide an independent perspective on TPS Lean course materials. For instance, if during your project work or because of your own personal interest you find a good reference on, say, Root Cause Analysis and 5 Whys, you could provide this information to the instructor / make it available to the rest of the class. This way the class shares knowledge from different projects and can seek to apply it to their project as appropriate.

**List of Project Sites** (details TBD):

1. Changing Gears Cincinnati (TBD)
2. Cincinnati Children’s Hospital (two small teams, two students each)
3. Great American Insurance Corp. (small team, two students)
4. Kroger, Blue Ash Technical Center (TBD)
5. UCHealth (team of about four students)

One other site may be added if the above does not fit the set of students registered for the class. Most likely this will be with a firm that already has a Lean Production System (to replace the Siemens Production System project that could not work out this Spring).

**Academic Integrity:** Active participation in class is essential. Submit only your own work done specifically for this course, provide sources of information where appropriate; follow student code of conduct, [http://www.uc.edu/conduct/Code_of_Conduct.html](http://www.uc.edu/conduct/Code_of_Conduct.html) and its LCB “Academic Integrity” version, [http://business.uc.edu/student-resources/academic-resources/advising/resources.html](http://business.uc.edu/student-resources/academic-resources/advising/resources.html).

**Special Needs, Religious, and other Accommodations:** Please meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course.