

Green and Sustainable Manufacturing Enterprise Systems

(綠色及永續製造企業系統)

Summer 2022

Instructor: Dr. F. Frank Chen

Time: Tuesdays & Wednesdays, (also 7/11 Monday)

14:00 -15:15; 15:30 - 16:45; and 17:00-18:15

Office: BGA0331

Office Hours: Wednesdays 10:30-12:00 noon

Classroom: BGA0340

Phone: 0919-551417 (cell phone)

E-mail: ff.chen@utsa.edu

Teaching Assistant: to be announced

Textbook:

- *Green Intentions: Creating a Green Value Stream to Compete and Win*, B. Wills, Productivity Press, New York, NY, 2009, ISBN: 978-1-4200-8961-5
- *Creating a Lean and Green Business System: Techniques for Improving Profits and Sustainability*, by K. Zokaei, H. Lovins, A. Wood and P. Hines, CRC Press, 2013, ISBN: 978-1-4665-7112-9

Major Reference Books:

- *Lean and Green: Profit for Your Workplace and Environment*, P. J. Gordon, Berrett-Koehler, San Francisco, CA, 2001, ISBN: 1-57675-170-8
- *Green Manufacturing: Case Studies in Lean and Sustainability*, Association for Manufacturing Excellence, Productivity Press, New York, NY, 2008, ISBN: 978-1-56327-389-6
- *The Innovative Lean Enterprise: Using the Principles of Lean to Create and Deliver Innovation to Customers*, by A. Sgroi, Jr., CRC Press, 2014, ISBN: 978-1-4822-0390-5

Grading Algorithm:

Mid-Term and Final Exam	75% (37.5% each)
Term Project Proposal & Report	15%
Term Project Presentation	10%
Class Participations and Attendance	5%

Date

Topic(s)

2022

July 11, 12, 13

Introduction to Lean Manufacturing & Value Stream Mapping
From Lean to Green and Sustainable Manufacturing
Chapter 1 – From Lean to Green: Green Value Stream Thinking
Chapter 2 – Understanding Your Green Value Streams
Chapter 3 – The First Green Waste: Energy
Chapter 4 – The Second Green Waste: Water
Chapter 5 – The Third Green Waste: Materials
Term Project Instructions Distributed

July 19 & 20

Chapter 6 – The Fourth Green Waste: Garbage
Chapter 7 – The Fifth Green Waste: Transportation
Chapter 8 – The Sixth Green Waste: Emissions
Chapter 9- The Seventh Green Waste: Biodiversity

Review and Discussions

July 26 & 27	Mid-Term Exam (14:00-15:15, <u>July 26</u>) Lecture on Success Stories and Advices US EPA Lean and Green Supply Chain (supplemental reading) Creating a Lean and Green Enterprise System – Parts I & II (second book) Review and Discussions
August 2 & 3	Term Project Proposal Due (at the beginning of class on August 2) Case Studies and Reading Assignments (to be assigned) Review and Discussions
August 9 & 10	Case Studies and Reading Assignments (to be assigned) Term Project Presentations (<u>August 10</u> , 15:30 – 18:15, must attend) Term Project Written Report (due at the end of class on <u>August 10</u> , 18:15)
August 16	Final Exam (<u>August 16</u> , 14:00-15:15) Review and Discussions

Notes:

- 1) Electronic lecture notes will be provided to all students.
- 2) Instructions for term project report and presentation will be provided separately.
- 3) Supplemental readings will be provided and discussed in class, if time allows. All supplemental readings discussed will be included in the exams.
- 4) Closed-book for both exams, but four-page (one-sided) notes are allowed.
- 5) Attendance and participation in class discussions are highly desirable.

F. FRANK CHEN

Dr. F. Frank Chen is the Lutch Brown Distinguished Chair in Advanced Manufacturing University of Texas at San Antonio where he served as the Interim Department Chair of Mechanical Engineering (2006-2007) and founded the [Center for Advanced Manufacturing and Lean Systems](#) (an Engineering/University level Center) and served as the center director (2007-2015). Before joining UTSA in 2006, he had been with Virginia Tech as the John L. Lawrence Endowed Professor of Manufacturing Systems Engineering with its Grado Department of Industrial and Systems Engineering since 1999. Dr. Chen was the founding Director and led the area of Flexible Automation and Lean Manufacturing Technologies of [the Center for High Performance Manufacturing](#) at Virginia Tech (2001-2006). Having support and participation from more than twenty faculty members at multiple universities, he established this interdisciplinary research center at Virginia Tech in 2001, with approximately \$9 million, multiple years of funding from the Virginia's Commonwealth Technology Research Fund, industry equipment and institutional matching funds. Before returning to academia in 1991, he was with Caterpillar Technical Center and held positions as a *Manufacturing Systems Engineer* in the Machining & Automation Division, a *Senior Manufacturing Systems Engineer* in the Metrology and Process Control Division, and a *Project Manager* leading a corporate research and technical services group with specialization in design and control of manufacturing cells.

His current research interests include lean tools and concepts for product development, healthcare, government/public sectors and R&D operations, design and operation of energy efficient buildings, intelligent manufacturing, and enterprise integration and transformation. As the author or co-author of over 265 technical papers and reports (100 appeared in refereed, archived journals), Dr. Chen was an associate editor of *SME Journal of Manufacturing Systems* (2008-2015) and has served in the editorial board of the [International Journal of Advanced Manufacturing Technology](#) where he also served as an editor or co-editor of two special issues on neural network and Petri nets applications in manufacturing and design. Dr. Chen has also served as editor and special issue editor for [Flexible Services and Manufacturing Journal](#) and editor of three special issues for the [International Journal of Robotics and Computer-Integrated Manufacturing](#). His book entitled [Trends in Supply Chain Design and Management: Technologies and Methodologies](#) (Springer Series in Advanced Manufacturing, 454 pages, ISBN: 1846286069) has appeared in March 2007. He serves as the editor of Book Collections on *Enterprise Engineering and Sustainability* area for the Momentum Press. Dr. Chen also served as conference co-chair (2011) and chair (2014) of the International Conference on Flexible Automation and Intelligent Manufacturing (FAIM).

Dr. Chen demonstrated prolific research careers in both industry and academia. He received the *Distinguished Services Award* from VP-Technical Services of Caterpillar Inc. in 1991. As one of the nine NSF nominated engineering professors in the nation who received the [1996 Presidential Faculty Fellows \(PFF, combined with first PECASE\) Award](#) from President Clinton at the White House, Dr. Chen has served as a principal investigator of over \$14 million externally funded research projects and equipment grants sponsored by agencies such as National Science Foundation, Caterpillar Inc., Air Force Office of Scientific Research, Army Research Office, Defense Advanced Research Projects Agency, and more recently Sandia National Laboratories and Office of Naval Research since 1991. Dr. Chen was instrumental in re-activating the Central Illinois IIE Chapter 080 and served as the chapter V.P. and Chairman of Technical Program Committee in 1990-1991. Dr. Chen has supervised 32 PhD students and postdoctoral researchers and 65 MS students so far. He has served in many research proposal review panels for organizations such as NSF, Ireland Science Foundation, Louisiana Department of Education, Texas Higher Education Coordinating Board, and Taiwan Ministry of Education. He was also a keynote speaker at several international conferences and as a distinguished lecturer at many institutions including a visiting chair professorship at [National Tsinghua University](#) (Taiwan), [National Taiwan University of Science and Technology](#), and [Tunghai University](#). As an effective educator/researcher, he received the [College of Engineering Awards for Excellence in Research](#) at UTSA and at Virginia Tech, the [Top Grant Producers Award](#) from FIU President, [Best Teaching Award](#) from the Lean Division of the IISE, [Teacher of the Year Award](#) from IIE Student Chapter at FIU, and the [Award for Excellence in Teaching](#) (as a graduate instructor) from the Mathematics Department at University of Missouri.

Dr. Chen received the B.E. (Industrial Engineering) from Tunghai University (in Taiwan) and the M.S. and Ph.D. degrees in industrial engineering from the University of Missouri-Columbia. He is a member of American Society of Engineering Education (ASEE), a Fellow of Institute of Industrial and Systems Engineers (IISE Fellow-2019), and an elected Fellow of Society of Manufacturing Engineers (FSME-2011).