ENGT 1200: INDUSTRIAL & SYSTEMS ENGINEERING
UNITS OF INSTRUCTION

WEEK	UNIT OF INSTRUCTION	LEARNING OBJECTIVES / GOALS	ASSESSMENT METHODS	ASSIGNMENTS	ASSIG. DUE DATE
Week 1	- (*supplemental handouts*) - Introductions / Syllabus / Purpose of the course - "Industrial & Systems Engineering" - definition and "systems approach" to problem solving - typical I.E. tasks and activities - relationship to other engineering disciplines - I.E.'s place in a variety of organizations - history - today - The Engineering Process - Paradeims and "paradeim flexibility" in finding solutions - Paradeim's video	Give students an overview of the course. Familiarize students with what Industrial and Systems Engineering, the engineering process, and paradeims are.	Assignments and Midterm Exam	Read supplemental handouts - *Assignment 1*	Week 2
Week 2	- (*supplemental handouts*) - Examples of where Industrial Engineering / paradeim flexibility has been used - Henry Ford's moving assembly line - IDEO shopping cart video - "The Profit TV" show - Everyday examples	Discuss paradeims and how they affect thinking and engineering related decisions.	Assignments and Midterm Exam	Read supplemental handouts - *Assignment 2*	

					Week 3
Week 3	- (*supplemental handouts*) - Introduction to Process Planning and the selection and sequencing of operations a.) Manufacturing Example: "Shoot the Moon" kids game (*Supplemental handouts*) - "Engineering drawings" (isometric, orthographic, and renderings) (individual, sub-assembly and assembly drawings) - "Bill of Material" - "Operation Process Chart" (all operations, inspections, sub-assemblies, and assemblies) - "10,000 foot" view - "Route sheet" (each part) - "Flow Process Chart" - "Flow Diagram" b.) Assembly Example: Commercial kitchen / mass production of sandwiches - Operation Process Chart for "standard" sandwich - Flow Process Chart for one component of the sandwich (lettuce)	Give students an overview of process planning and sequencing using manufacturing and assembly examples.	Assignments and Midterm Exam	Read supplemental handouts. Read textbook chapters listed in Units of Instruction for week 4. - *Assignment 3*	Week 4
Week 4	- (*textbook*) - Chapter 1 and 2: Overview of Process Improvements and Process Improvement Steps - occurrence and discovery of problem - analysis of current condition - identification of problem points - improvement plan	Explain and familiarize students with the over-arching concepts of	Midterm exam	Read chapters and pages shown under Units of Instruction for week 5.	

	- implementation and evaluation - follow up - Chapter 3: Process Analysis - what it is / why it is used / types ("product", "operator", "joint") - Process Analysis chart and symbols	process improvement. Introduce students to process analysis.		- *Assignment 4*	Week 5
Week 5	- (*textbook*) - Chapter 4: "Product" Process Analysis - what it is and its purpose - types: linear / converging / branching / and compounding - the seven analysis steps (preliminary study, flow chart, measurements, organization and analysis of the results, improvement plan, implementation and evaluation, standardization) - case studies https://www.youtube.com/watch?v=PpNmsQm_YSw https://www.youtube.com/watch?v=IUu9CNuKGYY	Explain and familiarize students with Product process analysis and its steps.	Assignments and Midterm Exam	Read chapters and pages shown under Units of Instruction for week 6. - *Assignment 5*	Week 6
Week 6	- (*textbook*) - Product Process Analysis presentations (part of Assignment 5) and class critique - Chapter 5: "Operator" Process Analysis - what it is and its purpose - the seven steps (preliminary study, flow chart, measurements, organize and analyze the results, improvement plan, implementation and evaluation, standardization) - case studies https://www.youtube.com/watch?v=k9vIhPszb2I https://www.youtube.com/watch?v=WVi_QfF5cl8	Class presentations related to Assignment 5 Explain and familiarize students with Operator process analysis and its steps.	Assignments and Midterm Exam	Read chapters and pages shown under Units of Instruction for week 7.	

	https://www.youtube.com/watch?v=27DRPtJ1_Lk https://www.youtube.com/watch?v=rDWrOddHnR8			- *Assignment 6*	Week 7
Week 7	- (*textbook*) - Operator Process Analysis presentations (part of Assignment 6) and class critique - Chapter 6: "Joint" Process Analysis - the seven steps (preliminary study, flow chart, measurements, organize and analyze the results, improvement plan, implementation and evaluation, standardization) - case studies - Review for midterm exam	Class presentations related to Assignment 5 Explain and familiarize students with Operator process analysis and its steps.	Assignments and Midterm Exam	Study for midterm exam. - *Assignment 7*	Week 8
Week 8	- *Midterm exam* - (*supplemental handouts*) - Lean - definition - focus - goals - major concepts - Common Lean Tools - value stream mapping - root cause analysis - reduction of any kind of waste ("muda", "mura", and "muri") - kan ban (pull system) - cellular work flow - work balancing and standardization - work environment conducive to efficiency (access	Explain and familiarize students with Lean and Lean tools.	**Midterm Exam**	Read supplemental handouts on Lean. Read assigned chapters of NSF e-book under Units of Instruction in week 9	

	to information), cross training, standardization to reduce variation, line balance - poka yoke (mistake proofing) - heijunka (inventory control /just-in-time) - 5 S's (sort, set (in order), shine, standardize,sustain) - kaizen (continuous improvement) - six sigma			- *Assignment 8*	Week 9
Week 9	- (*from NSF "Intro to Automated Warehouse E-textbook*"*) - Material Handling Equipment and components - industrial trucks - electric lifts, forklifts, reach trucks, pallet jacks, tugs, gas powered tow motors, booms, scissor lifts, - various conveyors and their components - automated storage and retrieval systems - robots - autonomous guided vehicles ("AGV's") - scanners and sensors - bar codes - hall effect sensors - RFID - Piezoelectric	Explain and familiarize students with various pieces of material handling equipment.	Assignments and Final Exam	Research the company and get directions to next week's tour	Week 10
Week 10	- tour at an advisory committee member's facility		Attendance and participation in the tour		
Week 11	- (*supplemental handouts*) - Time & motion study and work measurement - Methods of measuring work	Introduce students to time & motion study	Assignments and Final Exam	Read supplemental handouts on	

	- estimation / direct measurement / synthesis - "standard time", "average" - methodology - allowance - procedure https://www.youtube.com/watch?v=XUs5xkJF0vs https://www.youtube.com/watch?v=0ufrez3JMIQ https://www.youtube.com/watch?v=XUs5xkJF0vs	and work measurement		Work Measurement - *Assignment 9*	Week 12
Week 12	- (*supplemental handouts*) - Work design and Ergonomics - motion economy principles - workstation layout - work design and work design ergonomics - line balancing	Introduce students to work design and ergonomics.	Assignments and Final Exam	Read supplemental handouts on Work Design and Ergonomics - *Assignment 10*	Week 13
Week 13	- (*supplemental handouts*) - Quality and quality related charts - definition - history - Baldrige, Demming, Juran - benchmarking - SPC & SPC charts (flow, cause & effect, check sht., - Pareto, histogram, scatter, control, process capability)	Introduce students to the concept of quality and quality related charts.	Assignments and Final Exam	Read supplemental handouts on Quality - *Assignment 11*	Week 14

Week 14	- (*supplemental handouts*) - Preventative and predictive maintenance - Safety - regulatory agencies (OSHA, EPA, DOT) - codes and standards (NFPA, ANSI, NEMA, NIOSH, UL) - fire safety / fire extinguisher use / types of extinguishers - electrical safety / lockout-tag out - industrial hygiene / PPE	Explain and familiarize students with preventative & predictive maintenance and safety.	Assignments and Final Exam	Read supplemental handouts on Safety & Maint. - *Assignment 12*	Week 15
Week 15	- (*supplemental handouts*) - Review of I.E. terms and concepts - kan ban - muda, mura, muri - Paredo charts - Gantt Charts - poka yoke - check sheets - lean - scatter diagrams - continuous improvement - SPC - 6 sigma - SPC - kaizen - cause & effect (fishbone diagrams)	Review common Industrial Engineering terms and concepts.	Final Exam	Review supplemental handout on I.E. terms and concepts Review for final exam.	Week 16
Week 16	**Finals Week**		**Final Exam**		

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