

ENGT 1200: INDUSTRIAL & SYSTEMS ENGINEERING

UNITS OF INSTRUCTION

WEEK	UNIT OF INSTRUCTION	LEARNING OBJECTIVES / GOALS	ASSESSMENT METHODS	ASSIGNMENTS	ASSIG. DUE DATE
Week 1	<ul style="list-style-type: none"> - <i>(supplemental handouts)</i> - Introductions / Syllabus / Purpose of the course - “Industrial & Systems Engineering” <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - Paradeim’s video 	<p>Give students an overview of the course.</p> <p>Familiarize students with what Industrial and Systems Engineering, the engineering process, and paradeims are.</p>	Assignments and Midterm Exam	<p>Read supplemental handouts</p> <p>- <i>Assignment 1</i></p>	Week 2
Week 2	<ul style="list-style-type: none"> - <i>(supplemental handouts)</i> - Examples of where Industrial Engineering / paradeim flexibility has been used <ul style="list-style-type: none"> - 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	<p>Read supplemental handouts</p> <p>- <i>Assignment 2</i></p>	

					Week 3
Week 3	<p>- (<i>supplemental handouts</i>)</p> <p>- Introduction to Process Planning and the selection and sequencing of operations</p> <p>a.) Manufacturing Example: “Shoot the Moon” kids game (<i>Supplemental handouts</i>)</p> <ul style="list-style-type: none"> - “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) <ul style="list-style-type: none"> - “10,000 foot” view - “Route sheet” (each part) - “Flow Process Chart” - “Flow Diagram” <p>b.) Assembly Example: Commercial kitchen / mass production of sandwiches</p> <ul style="list-style-type: none"> - 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	<p>Read supplemental handouts.</p> <p>Read textbook chapters listed in Units of Instruction for week 4.</p> <p>- <i>Assignment 3</i></p>	Week 4
Week 4	<p>- (<i>textbook</i>)</p> <p>- Chapter 1 and 2: Overview of Process Improvements and Process Improvement Steps</p> <ul style="list-style-type: none"> - 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.	

	<ul style="list-style-type: none"> - implementation and evaluation - follow up <p>- Chapter 3: Process Analysis</p> <ul style="list-style-type: none"> - what it is / why it is used / types (“product”, “operator”, “joint”) - Process Analysis chart and symbols 	<p>process improvement.</p> <p>Introduce students to process analysis.</p>			- <i>Assignment 4</i>	Week 5
Week 5	<p>- (<i>textbook</i>)</p> <p>- Chapter 4: “Product” Process Analysis</p> <ul style="list-style-type: none"> - 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 <p>https://www.youtube.com/watch?v=PpNmsQm_YSw</p> <p>https://www.youtube.com/watch?v=IUu9CNuKGYy</p>	<p>Explain and familiarize students with Product process analysis and its steps.</p>	<p>Assignments and Midterm Exam</p>	<p>Read chapters and pages shown under Units of Instruction for week 6.</p>	- <i>Assignment 5</i>	Week 6
Week 6	<p>- (<i>textbook</i>)</p> <p>- Product Process Analysis presentations (part of Assignment 5) and class critique</p> <p>- Chapter 5: “Operator” Process Analysis</p> <ul style="list-style-type: none"> - 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 <p>https://www.youtube.com/watch?v=k9vIhPszb2I</p> <p>https://www.youtube.com/watch?v=WVi_QfF5cl8</p>	<p>Class presentations related to Assignment 5</p> <p>Explain and familiarize students with Operator process analysis and its steps.</p>	<p>Assignments and Midterm Exam</p>	<p>Read chapters and pages shown under Units of Instruction for week 7.</p>		

	https://www.youtube.com/watch?v=27DRPtJ1_Lk https://www.youtube.com/watch?v=rDWrOddHnR8			- <i>Assignment 6</i>	Week 7
Week 7	<ul style="list-style-type: none"> - (<i>textbook</i>) - Operator Process Analysis presentations (part of Assignment 6) and class critique - Chapter 6: “Joint” Process Analysis <ul style="list-style-type: none"> - 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 	<p>Class presentations related to Assignment 5</p> <p>Explain and familiarize students with Operator process analysis and its steps.</p>	Assignments and Midterm Exam	<p>Study for midterm exam.</p> <p>- <i>Assignment 7</i></p>	Week 8
Week 8	<ul style="list-style-type: none"> - <i>Midterm exam</i> - (<i>supplemental handouts</i>) - Lean <ul style="list-style-type: none"> - definition - focus - goals - major concepts - Common Lean Tools <ul style="list-style-type: none"> - 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 	<p>Explain and familiarize students with Lean and Lean tools.</p>	Midterm Exam	<p>Read supplemental handouts on Lean.</p> <p>Read assigned chapters of NSF e-book under Units of Instruction in week 9</p>	

	<p>to information), cross training, standardization to reduce variation, line balance</p> <ul style="list-style-type: none"> - 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 			- <i>Assignment 8</i>	Week 9
Week 9	<p>- (from NSF "Intro to Automated Warehouse E-textbook"*)</p> <p>- Material Handling Equipment and components</p> <ul style="list-style-type: none"> - industrial trucks <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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	<p>- (supplemental handouts)</p> <ul style="list-style-type: none"> - Time & motion study and work measurement - Methods of measuring work 	Introduce students to time & motion study	Assignments and Final Exam	Read supplemental handouts on	

	<ul style="list-style-type: none"> - estimation / direct measurement / synthesis - “standard time”, “average” - methodology - allowance - procedure <p> https://www.youtube.com/watch?v=XUs5xkJF0vs https://www.youtube.com/watch?v=0ufrez3JMIQ https://www.youtube.com/watch?v=XUs5xkJF0vs </p>	and work measurement		Work Measurement	
Week 12	<ul style="list-style-type: none"> - (<i>supplemental handouts</i>) - Work design and Ergonomics <ul style="list-style-type: none"> - 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	
Week 13	<ul style="list-style-type: none"> - (<i>supplemental handouts</i>) - Quality and quality related charts <ul style="list-style-type: none"> - 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	
				- <i>Assignment 9</i>	Week 12
				- <i>Assignment 10</i>	Week 13
				- <i>Assignment 11</i>	Week 14

Week 14	<ul style="list-style-type: none"> - (<i>supplemental handouts</i>) - Preventative and predictive maintenance - Safety <ul style="list-style-type: none"> - 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. - <i>Assignment 12</i>	Week 15
Week 15	<ul style="list-style-type: none"> - (<i>supplemental handouts</i>) - Review of I.E. terms and concepts <ul style="list-style-type: none"> - kan ban - Pareto charts - poka yoke - lean - continuous improvement - SPC - cause & effect (fishbone diagrams) - muda, mura, muri - Gantt Charts - check sheets - scatter diagrams - SPC - 6 sigma - kaizen 	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		