

**NEW JERSEY INSTITUTE OF TECHNOLOGY**  
**Department of Mechanical and Industrial Engineering**  
**IE 339: Work Measurement & Standards**

**Fall 2023**

**INSTRUCTOR:** Professor: **Sandra Tovar**

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**OFFICE HOURS:** Tuesday: 5:00 - 5:50 p.m. and by appointment

**LECTURE:** Tuesday: 6:00 p.m. – 8:00 p.m. (**GITC2311**) **LAB:** Tuesday: 8:10 p.m. – 10:00 p.m. (**GITC2311**)

**Course Lectures and Requirements:** available at <http://canvas.njit.edu/>

**TEXT:** Niebel's Methods, Standards, and Work Design, 13<sup>th</sup> Edition.

**Course Description:** Prerequisites: IE 203, IE 224. Emphasizes the measurement and evaluation of existing work methods and how improvement can be achieved. Topics include visual and micro-motion study techniques, motion economy, time study, and work sampling. The development and use of standard data and computerized techniques. Also, hands-on experience through a series of laboratory experiments.

**Course Objectives:**

- **Probability and Basic Statistics.** Understand how to apply basic statistical methods to interpret data, and to combine these methods with visual data displays to understand the effect of variability in Visual inspection in signal detection tasks
- **Software Use.** Learn how to use MS Excel and Design Tool to analyze various problems for time study, work sampling, standard data, and costing.
- **Problem Solving.** Proposing an alternative design to achieve a lower standard time for the operation.

**GRADING:** Final Exam ...30% Mid-term...30% Case Studies...15% Homework...15% Quizzes...10%

**Course Outline:** *The syllabus may be subject to change.* [the \*\*\*\* indicates the Quiz date]

Month	Day	Topics	Chapter	HW
September	5	Introduction, History - Ethics, Pinto, Job Analysis	Ch. 1,2	1: 1,2,3 2: 2,5,8,9
	12	<b>Case Study 1: Principles of Motion Economy &amp; Visual Motion Study</b>		
	12	Operation Analysis	Ch. 3	3: 1,3,4
	19	Musculo Principles, Manual Work, Low back	Ch. 4	4: 2,4,5,8
	26	<b>Case Study 2: Micromotion Study: A Videotape Analysis</b>		
****	26	CTD Risk, Tools, Workplace	Ch 5	5: 3,4,6,7
October	3	<b>Case Study 3: Job/Worksite and Flow Process Analysis</b>		
	3	Illumination, Noise, Heat stress	Ch 6	6: 5,6,10,11,12
	10	<b>Case Study 4: CTD Analysis, Workplace/Tool Design and Ethics</b>		
	10	Human Information Processing	Ch. 7	7: 1,2,6,14
	17	<b>Case Study 5: Cognitive Module</b>		
****	17	Systems Safety	Ch. 8	8: 1,3,4,8

	24	<b>Case Study 6: Information Processing and ATM Design</b>		
	24	Time Study	Ch. 10	<b>10:</b> 5,7,12,13
	24	<b>Midterm Review</b>		
Oct. 31		<b>MIDTERM</b>	<b>Chapters 1-8</b>	
November	7	Rating /Allowances	Ch. 11	<b>11:</b> 2,3,4,5,6,8
	14	<b>Case Study 8: Time Study Equipment &amp; Training</b>		
****	14	Standard data and Costing	Ch. 12	<b>12:</b> 2,3,6,7,11
	21	<b>NO CLASS - Thursday Classes Schedule.</b>		
	23-26	<b>**** Thanksgiving Recess, No Classes Scheduled ****</b>		
	28	<b>Case Study 9: Continuous &amp; Snapback time Study on Lathe Operation</b>		
	28	Predetermined Time Systems	Ch. 13	<b>13:</b> 2,4,6,10
December	5	<b>Case Study 10: Performance Rating Training</b>		
	5	Work Sampling	Ch. 14	<b>14:</b> 4,5,6,7,9
	12	Wage Incentives	Ch. 17	<b>17:</b> 1,4,5,7
	12	<b>Final Review</b>		
Dec. 19		<b>FINAL EXAM</b>		

## Important Notes

- The use of any electronic devices during class and laboratory sessions; including but not limited to: laptops, cell phones, tablets, social media, etc., is **prohibited** for non-class related functions.
- Homework is due the week following the date they are assigned. It is expected that class participants will observe specified deadlines. There will be no deviations from scheduled due dates and test dates. The assignments **will not be accepted after the noted deadline**. However, because all deadlines and assignments are known to you by no later the second week of classes, deadlines should present no problems to class participants.
- Exams will consider all materials covered in the lectures, which may not be in the book.** Therefore attendance of lectures is very important.
- HONOR & ETHICS**  
The code of unspoken ethics in a professional work environment in the US will apply in the classroom. That is, honesty and ethical conduct will not only be expected, but demanded. Please see me if you have any confusion on what I mean. Clearly, cheating on an exam is not permitted. Students caught in violation of this policy will earn a failing grades on their exam. Cooperation in responding to homework questions is not only permitted, but encouraged, as part of the cooperative learning framework of the course. You may discuss homework problems but not copy someone else's work. Any persons caught copying as well as the person providing the homework will be penalized.
- Attendance at the Laboratory sessions is a necessary part of group work and group grade. Thus, it is my policy that individuals who are late more than **15 minutes** or **absent** (without a valid medical or other University approved excuse) will be penalized 100% on the full reports or receive a 0 for the forms. It is important that all group members participate in the case study experience. A full report for each case study is required to be handed in one week after the session being conducted. The time study test will be an in-lab test performed individually with the value of one full report.

## Software Applications

To help reinforce the use of computer software to solve assignments, there are two packages: Excel and Design Tools. You will be required to submit your assignments in either format of the abovementioned software, and a printout of worksheet with explanation. In some cases, the computations that you perform must be visualized by a graph.

### **BSIE Program Educational Objectives**

1. Program graduates use the fundamental principles and major areas of Industrial Engineering in their professional practice.
2. Program graduates are life-long learners, pursuing graduate education, and professional growth in Industrial Engineering and related fields.
3. Program graduates pursue diverse career paths and advance in a variety of industries.

### **BSIE Student Outcomes**

- (1) *An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics*
- (2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social and economic factors
- (3) An ability to communicate effectively with a range of audiences
- (4) *An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and social contexts*
- (5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- (6) An ability to conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions
- (7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

### **IE 339 Outcomes of Instruction:**

- 1 Understand how to apply Statistical Methods (1).
- 2 Able to apply Excel and Design Tools to Visual inspection (1).
- 3 Understand the concepts of Time Study and Learning curves (1).
- 4 Conduct experimentation, analyze & interpret data (6)
- 4 Develop more proficient problem-solving skills (4).