**American University of Beirut**
**Faculty of Engineering and Architecture**
**Industrial Engineering and Management Department**

# INDE 421: Human Factors Engineering

Fall 2017: 10:00 am – 11:30 pm, Mon & Wed, Bechtel Engineering Building, Rm 111

**Instructor:**
Dr. Saif Al-Qaisi
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Office: Bechtel 533
Office Hours: Tuesday: 11:00 am – 12:30 pm; Wednesday 1:30 pm – 3:00 pm; and/or by appointment.

**Course Description:** Introduces human factors and ergonomics. Analysis and design of systems considering human characteristics, capabilities, and limitations. Designing for human performance effectiveness, productivity, and comfort. Topics include: design and evaluation methods; perception-vision and hearing; information processing; display and control design; workplace design; environmental effects on worker performance; biomechanics of work; stress and workload; safety and human error; human-computer interaction.

**Pre-requisite:** INDE 320.

**Learning Outcomes:**
Students will be able to:

1. Explain the basic concepts of human factors and the importance of considering human capabilities and limits in system design.
2. Design the workspace, tools, interfaces, and tasks to match the physical, physiological, biomechanical, and mental capability of a worker.
3. Describe human anatomy, metabolic monitoring, strength measurements, anthropometric measurements, and visual and hearing tests.
4. Explain cognitive ergonomics including workload and stress, visual displays, controls, decision making and errors, and workstation design.
5. Collect and analyze data using ergonomic tools, equipment, and software.
6. Conduct and present an ergonomics project.

**Textbook:** B. Mustafa Pulat, "Fundamentals of Industrial Ergonomics," 2nd ed. Waveland Press Inc. IL, 1997.

**Additional Reference:** Pamela McCauley Bush, "Ergonomics Foundational Principles, Applications, and Technologies," CRC Press, Taylor & Francis Group, 2012.

**Chapters of textbook:**

- Chapter 1: Introduction and History of Ergonomics
- Chapter 2: The Ergonomics Function
- Chapter 3: Physical Ergonomics
- Chapter 4: Information Ergonomics
- Chapter 5: Engineering Anthropometry
- Chapter 6: Human-Machine Systems Design
- Chapter 7: Work Area Design
- Chapter 8: Job Design
- Chapter 9: Design of Work Environment
- Chapter 10: Design of Displays and Controls

**Final Grade is weighted as follows:**

| | |
|---|---|
| Participation | 5% |
| Homeworks, (pop) quizzes, lab work | 20% |
| Projects | 20% |
| Mid-Term Exam | 25% |
| Final Exam | 30% |
| | 100% |

**Pop-Quiz/Participation**
On random days during the semester, I will announce that there will be a quiz by the end of the class. The quiz will only cover material taught on that day. Students must be attentive in order to perform well. If you do not understand a topic, ask because it may be on the quiz. These quizzes are designed to encourage in-class participation and enhance your learning experience.

**Homework**
Homework's will be assigned periodically concerning the course material. Typically, they will be questions from the chapter review sections of the textbook.

**Lab Work**
Students will gain hands-on experience with contemporary ergonomic tools, equipment, and software. Some classes during the semester will be held in the ergonomics lab, where students will collect and analyze data. The assignments will be questions about the lab experiment and data analysis.

**Projects**
After the middle of the semester, groups will be formed to carry out a project using ergonomic tools, equipment, and/or software. Different topics will be proposed by the professor. Also, students will be allowed to work on their own project ideas after receiving approval from the professor. The deliverables of the project will be a formal report and a presentation.

**Exams**
There will be two exams in this course, mid-term and final exam. No make-up exams will be granted.

**Late/Missed Work Policy**
As future engineers, you must learn to be prompt and capable of meeting deadlines. Assignments will be due at the beginning of the class period. Assignments may be turned in late with the following penalties:
Turned in **after the class has begun**: -10%
Turned in **1 day late**: -10%
Turned in **2 or more days late**: Assignment not accepted, unless a university-approved excuse is provided.

**Accommodation for Disability**
AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a disability (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions), please do not hesitate to inform the Accessible Education Office. In order to ensure that you receive the support you need and to facilitate a smooth accommodations process, you must register with the Accessible Education Office (AEO) as soon as possible: accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314.