Course Syllabus

1	**Course title**	Integrated Systems Design
2	**Course number**	0908564 (Department Elective)
3	**Credit hours**	3
	Contact hours (theory, practical)	3 hours theoretical
4	**Prerequisites/corequisites**	Mechatronics Systems (908561)
5	**Program title**	B.Sc. in Mechatronics Engineering
6	**Program code**	
7	**Awarding institution**	The University of Jordan
8	**School**	School of Engineering
9	**Department**	Mechatronics Engineering Department
10	**Level of course**	5th year
11	**Year of study and semester (s)**	2021/2022 2nd Semester
12	**Other department (s) involved in teaching the course**	None
13	**Language of Instruction**	English
14	**Teaching methodology**	☒Blended ☐Online
15	**Electronic platform(s)**	☒Moodle ☒Microsoft Teams ☐Skype ☐Zoom ☒Others: YouTube
16	**Date of production/revision**	1/3/2022

18 Course Coordinator:

Dr. Osama Al-Hababheh
Office: Mechatronics Dept., 3rd Floor, Tel: 5355000 ext. 23031, 23025
Email: o.hababheh@ju.edu.jo

19 Other instructors:

None

20 Course Description:

Course Objectives: The course provides the students with general overview of systems engineering principles, and how the various components of any system can be integrated. They will learn all the stages of system's life cycle from design to disposal, with focus on the principles of safety, maintainability, and reliability. In addition, they will learn the skills of evaluating the maintainability and reliability of engineering systems, as well as Electromagnetic compatibility (EMC).

Course contents: Engineering design methodology: Product life cycle, design models, design process, interface specifications (Boundary conditions), modular design, component design/selection, implementation to form a system, design hierarchy, system verification, integration and verification

problems, installation and validation, operation and maintenance, failure mode analysis, Electromagnetic Compatibility (EMC).

21 Course aims and outcomes:

Upon successful completion of this course, a student should:

1. Recognize the basics of Systems Engineering
2. Understand Product life cycle
3. Understand Engineering Design Methodology
4. Recognize the concepts of safety, failure, and risk
5. Employ reliability and maintainability methods for system evaluation
6. Understand Design Assurance, Review, and Testing
7. Recognize Project Management methods and Contracts
8. Understand Electromagnetic interference (EMI)
9. Prepare and present a term project

22. Topic Outline and Schedule:

Week	Lecture	Topic	Teaching Methods/ platform	Evaluation Methods	Resources
1	1	Introduction: Systems Engineering	Class room		Handouts
	2-a	Product life cycle	Teams		Handouts
	2-b	Design to disposal	Teams		Handouts
2	3	Reliability and availability	Class room		Ch-1
	4-a	Terms	Teams		Ch-2
	4-b	Jargon	Teams		Ch-2
3	5	A cost-effective approach to quality, reliability and safety	Class room		Ch-3
	6-a	Failure rates	Teams		Ch-4
	6-b	Interpreting failure rates	Teams		Ch-4
4	7	Interpreting data and demonstrating reliability	Class room		Ch-5
	8-a	Variable failure rates	Teams		Ch-6
	8-b	Probability plotting	Teams		Ch-6
5	9	Basic reliability prediction theory	Class room		Ch-7
	10-a	Modeling	Teams		Ch-8
	10-b	Methods of modeling	Teams		Ch-8
6	11	Quantifying the reliability models	Class room		Ch-9
	12-a	Risk assessment (QRA)	Teams		Ch-10
	12-b	Quantified QRA	Teams		Ch-10
7	13	Design and assurance techniques	Class room		Ch-11
	14-a	Design review	Teams		Ch-12
	14-b	Design test	Teams		Ch-12
8	15	Field data collection and feedback	Class room		Ch-13
	16-a	Down time	Teams		Ch-14
	16-b	Factors influencing down time	Teams		Ch-14
9	17	Predicting and demonstrating repair times	Class room		Ch-15
	18-a	Reliability-centered maintenance (QRCM)	Teams		Ch-16
	18-b	Quantified QRCM	Teams		Ch-16

10	19	Systematic failures, especially software	Class room		Ch-17
	20-a	Project management-1	Teams		Ch-18
	20-b	Project management-2	Teams		Ch-18
11	21	Contract clauses and their pitfalls	Class room		Ch-19
	22-a	Product liability	Teams		Ch-20
	22-b	Safety legislation	Teams		Ch-20
12	23	Safety-related systems	Class room		Ch-22
	24-a	Integrity of safety-related systems	Teams		Ch-22
	24-b	Electromagnetic compatibility	Teams		Handouts

23 Evaluation Methods:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	Period (Week)	Platform
Project	20	All Topics	13	Printed
Midterm exam	30	Midterm material	8	On-campus
Final Exam	50	Post midterm material	16	On-campus

24 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):

Each student should have a Textbook, Computer, Internet access, Webcam & Scientific calculator.

25 Course Policies:

A- Attendance policies: Attendance will be taken every class and University policy will be enforced.

B- Absences from exams and submitting assignments on time: Absence not allowed and no Late submission.

C- Health and safety procedures: As per University policy

D- Honesty policy regarding cheating, plagiarism, misbehavior: Not tolerated as per University policy

E- Grading policy: As mentioned in Evaluation Methods above.

F- Available university services that support achievement in the course: Platforms, Instructor support, Administrative support.

26 References:

Required book (s), assigned reading and videos:

- Online and Multimedia:
  - Chapters handouts by Dr. Osama Al-Habahbeh. Accessed at: http://elearning.ju.edu.jo/

- Text book: "Reliability, Maintainability and Risk: Practical Methods for Engineers", David J. Smith, Butterworth Heinemann/Elsevier, 7th Edition, 2005.
- Reference books: None

27 Additional information:

Name of Course Coordinator: --- **Dr. Osama Al-Habahbeh** --Signature: ---------- Date: 1/3/2022

Head of Curriculum Committee/Department: ---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of Curriculum Committee/Faculty: ---------- Signature: ----------

Dean: ---------- Signature: ----------