**The Hashemite University**
**Faculty of Engineering**
**Course Syllabus**

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| **Course Title:** | **Composite Materials** | **Course Number:** | 110402536 |
| **Department:** | Mechanical Engineering | **Designation:** | Elective |
| **Prerequisite(s):** | 110402212 | | |
| **Instructor:** | Dr. Faris AL-Oqla | **Instructor's Office:** | E3094 |
| **Instructor's e-mail:** | fmaloqla@hu.edu.jo | | |
| **Office Hours:** | See posted office hours. | | |

**Course description:** Today's composite materials often outshine traditional materials; they are lightweight, corrosion-resistant, and strong. They are used in everything from aircraft structures to golf clubs, and serving industries from medicine to space exploration, composites are an exciting field of study for students, engineers, and researchers around the world. New applications of these versatile materials are being found daily. This course provides a complete introduction to the mechanical behavior of composites. Moreover, this course introduces theory, application, and design with composite materials, including high performance resin-matrix fibrous composites and metal-matrix materials. Topics include materials, test techniques, environmental effects, design considerations, and application requirements.

**Textbook(s):** **Mechanics of Composite Materials, Autar K. Kaw, Second edition, Taylor & Francis Group.**

**References:**

- *K. K. Chawla, Composite Materials: Science and Engineering. New York: Springer, 2012.*
- *D. Gay, Composite materials: design and applications: CRC press, 2014.*
- *P. K. Mallick, Fiber-reinforced composites: materials, manufacturing, and design: CRC press, 2007.*
- ***F. M. AL-Oqla and S. M. Sapuan**, "Natural fiber reinforced polymer composites in industrial applications: feasibility of date palm fibers for sustainable automotive industry," Journal of Cleaner Production, vol. 66, pp. 347-354, 2014.*

**Course Objectives:** After completing the **Composite Materials** course, the student will:

- Explain the basics of composites, including their importance to industry.
- Identify type of synthetic and natural composites applications, manufacturing and recycling.
- Discuss the mechanical behavior and properties of a single lamina.
- Calculate properties of a unidirectional lamina from individual constituent properties.
- Explain the macro-mechanics of laminates.
- Analyzes the failure and design of laminated composites.

**Class schedule:** Two class sessions each week; 75 minutes each

**Grading Plan:**

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| Midterm Exam | (25 Points) | TBA |
| Project | (30 Points) | TBA |
| Presentation | ( 5 Points) | TBA |
| Final exam | (40 Points) | TBA |

**Course relationship to program outcomes:**

| ABE T a-k | | ME Program Outcomes |
|---|---|---|
| a | √ | Apply knowledge of science, mathematics (including multivariate calculus, linear algebra, differential equations) and engineering fundamentals to mechanical engineering applications. |
| b | | Design and conduct experiments, as well as analyze and present results in a professional manner. |
| c | √ | Design, model, analyze and realize a component, system (thermal or mechanical), or process to meet specific requirements and realistic constraints. |
| d | | Communicate effectively, and function in multidisciplinary teams. |
| e | √ | Identify, formulate, and solve engineering problems. |
| f | | Understand professional and ethical issues and the responsibilities of the engineering practice. |
| g | √ | Recognize contemporary issues and environmental, cultural, and economical consideration of the engineering profession. |
| h | √ | Identify the need for professional development and engage in life-long learning. |
| i | | Use the techniques, skills, and modern engineering and computing tools necessary for engineering practice. |
| *j* | | Apply the basics of statistics and probability. |
| k | | Recognize the need and engage in solving national environmental issues. |

**Prepared by:** Dr. Faris AL-Oqla **Date:** 5/10/2020