**Course name: Composite Materials Engineering – MatE 6314**

**Instructor: Dawit Gemechu (Ph.D.)**

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| **Course Code** | MatE 6314 |
| **ECTS** | 6 |
| **Course Objective** | Introduction of composite materials from engineering design, manufacturing, and application viewpoints. The course will help students to understand the properties of engineering composite materials that should be reproducible and accurately known. It will enable the students to exploit the vast design flexibility that results from tailoring the properties of a combination of materials to suit a particular requirement, and also to be able to predict those properties.  |
| **Course Contents:**  | * **Introduction**: Definition and general characteristics of Composite and composite materials
* **Composite materials:** composites in nature and beyond
* **General properties of composite materials**
* **Classification of composite materials:** according to type of matrix and reinforcement
	+ Matrix and reinforcement
	+ Metal Matrix Composites (MMC)
	+ Ceramic Matrix Composites (CMC)
	+ Polymer Matrix Composites (PMC)
	+ Particle reinforced composite materials
	+ Fiber reinforced composite materials
	+ Structural composites (laminates and sandwich structures)
* **Composite micromechanics and mechanics theory**: Rule of mixtures, laminate theory, failure criteria, stiffness, strength, stress concentration
* **Applications and fabrication techniques of composite materials**
* **Case studies and design projects**
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| **A/Y: 2019/20** | Year I Semester II |
| **References:**  | 1. Walter Krenkel,‘Ceramic Matrix Composites: Fiber Reinforced Ceramics and their Applications’, 2008 Wiley‐VCH Verlag GmbH & Co. KGaA
2. Randall M. German, Particulate Composites Fundamentals and Applications
3. Composite Materials: Science and Engineering, Chawla, Krishan K. , 2012
4. Composite Materials: Engineering and Science, [Frank L. Matthews](http://www.google.com.et/search?tbo=p&tbm=bks&q=inauthor:%22Frank+L.+Matthews%22), [R D Rawlings](http://www.google.com.et/search?tbo=p&tbm=bks&q=inauthor:%22R+D+Rawlings%22), CRC Press, Sep 15, 1999 - [Technology & Engineering](http://www.google.com.et/search?tbo=p&tbm=bks&q=subject:%22Technology+%26+Engineering%22&source=gbs_ge_summary_r&cad=0)
5. Micromechanics of Composite Materials, George J. Dvorak
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| **Teaching Methodology and assessment strategy** | Lecture / Tutorial |
| * Assignments and Paper Review
* Final Examination
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