

(Textile Engineering Department)

Graduate

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Course Title: **Structural Theories of Fabrics**

Lecturer: **Dr. Hadi Dabiryan**

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**Course Topics:**

- Theoretical models of warp knitted fabrics : Alison, Grosberg, Raz, and straight line models
- The relationships between fabrics bending and their structural parameters
- Initial modulus of plain woven fabrics
- Geometry of weft knitted fabrics; Theoretical loop models of Chamberlain, Peirce
- Experimental loop models; Buckling theory for elastic rod
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- 2D and 3D Ideal loop models for rib and interlock
- Fabric relaxation methods; mechanical and chemical
- Kemp's geometry of plain-weave fabrics; Hearle's lenticular cross-section geometry of plain-weave fabrics
- Cover factor of fabrics ; Yarn Diameter; Fabric Thickness
- Geometrical and mechanical model of fabrics based on yarn path; Structure of fabric under biaxial tension
- Introduction of mechanical behavior of textiles; Energy method; Castigliano's Theorem
- Munden's loop model ;Theoretical and experimental
- Weft knitted fabrics with complex structure
- Mathematical analysis of effective parameters on the fabric shrinkage
- The relationship between fabric surface parameter ( $K_s$ ) and fiber density
- The geometry of plain knitted fabric under bi-axial stress
- Geometrical model of Woven fabric structure; Peirce's circular cross-section geometry of plain-weave fabrics

**Reading Resources:**

- Behera B. K. and Hari P. K. (2010), Woven Textile Structure; Theory and Applications, Woodhead Publishing Limited.
- Hearle JWS, Grosberg P and Backer S (1969), Structural Mechanics of Fibers, Yarns, and Fabrics, Wiley-Interscience
- Postle R., Carnaby G. A. and DeJong S (1988)., The Mechanics of Wool Structures, Ellis Horwood Limited.