CEVAT ERISKEN, Ph.D.

WORK & MAILING ADDRESS:

TOBB University of Economics and Technology,
Biomedical Engineering,
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1. EDUCATION

PH.D., CHEMICAL AND BIOMEDICAL ENGINEERING, Stevens Institute of Technology, NJ, USA
M.SC., ECONOMICS, City University of London, UK
B.SC. & M.SC., CHEMICAL ENGINEERING, Middle East Technical University, Turkey

2. ACADEMIC POSITIONS

2014- **ASSISTANT PROFESSOR,** TOBB University of Economics and Technology, Biomedical Engineering, Turkey.
2012-2014 **ASSISTANT PROFESSOR,** Columbia University Medical Center, New York, NY.
2008-2012 **POST-DOCTORAL FELLOW,** Columbia University, Biomedical Eng., NY, Mentor: Helen H. Lu

3. GRANTS, HONORS, AWARDS

2017-2020 Biological regeneration of osteochondral defect in a rabbit knee model using cell recruitment approach, The Scientific and Technological Research Council of Turkey (TÜBİTAK), Accepted Application, Primary Investigator

2016 Certificate of Achievement, 2016 Journal of Endodontics Awards: Honorable Mention as the corresponding-author of the article "Viscoelastic properties of dental pulp tissue and ramifications on biomaterial development for pulp regeneration" *Journal of Endodontics* 2015, 41(10): 1711-1717.

2014-2016 Design and fabrication of biomimetic scaffolds for tendon-bone interface regeneration, The Scientific and Technological Research Council of Turkey (TÜBİTAK), Grant No: 115C001, Primary Investigator

2012-2014 Tracking stem cells in engineered tissue and organs in vivo and in real time, National Institutes of Health, USA, Grant No: GG005340-01, Researcher

2012-2014 Engineering of Vascularized Bone, National Institutes of Health, USA, Grant No: GG005421-01, Researcher

2008-2012 Nanofiber scaffolds for interface tissue engineering, National Institutes of Health, USA, Grant No: AR052402, Researcher

2009 Davis Memorial Award for Research Excellence at Stevens Institute of Technology for the development of a novel extrusion/electrospinning technology, Hoboken, NJ, USA

2008 Ph.D. Achievement Award of Excellence by Stevens Institute of Technology, Hoboken, NJ

2005 Ph.D. Scholarship by Stevens Institute of Technology, Hoboken, NJ

2004 European Commission (Jean Monnet) award for a Master's degree in the Department of Economics at City University of London, UK

4. PROFESSIONAL ACTIVITIES

A. NON-ACADEMIC DUTIES AND PROFESSIONAL MEMBERSHIPS

2013 - University Senator, Columbia University in the City of New York, NY
2011 - Orthopedic Research Society
2011 - Biomedical Engineering Society
2010 - Society for Biomaterials
2007 - American Institute of Chemical Engineers

B. EDITORIAL BOARD MEMBER

J Tissue Science and Engineering
Dental Research: An International Journal
Journal of Biomedical Engineering and Informatics

C. REVIEWER

Cellular and Molecular Bioengineering
Clinical Orthopaedics and Related Research
Colloids and Surfaces B: Biointerfaces
Heliyon
Journal of Biomedical Materials Research
Journal of Nanomaterials
Material Science and Engineering
Polymer Engineering and Science
Tissue Engineering

5. RELEVANT RESEARCH EXPERIENCE

Biomaterials and Devices:

- Design/fabrication/use of microfluidics devices for investigating chemotactic cell migration and circulation
- Design & fabrication of polymeric scaffolds using 3D printing and their use in regeneration of bone and meniscal tissues
- Design & fabrication of nanofiber scaffolds with controlled geometries and compositions
- Modeling of release of bioactive molecules from various geometries such as fibers and spheres
- Biomaterial design and synthesis for dental pulp regeneration
- Investigation of *small chemical molecules* as alternatives for chemotactic cues in cell homing based tissue regeneration

Bioreactors:

- Design of a novel bioreactor that allows for cell culture under small amplitude oscillatory shear stresses to mimic the environment which is akin to cartilage tissue physiology

Stem cells and specialized cells

- Homing/recruitment of stem cells of different origins including embryonic stem cells, induced pluripotent stem cells, neural stem cells, hematopoietic stem cells, and mesenchymal stem cells

Animal studies:

- Mice, rats, and sheep (cell homing, ACL reconstruction and subcutaneous models, ligament and meniscal tissue regeneration)

Native tissue harvest and characterization:

- Characterization of bovine and rat ligaments, tendons, and their insertions to bone
- Isolation of bovine bone marrow stromal cells (BMSCs), their characterization and culture
- Differentiation behavior of human BMSCs in the presence of bFGF and TGF-β3
- Isolation of chondrocytes, ligament fibroblasts and tendon fibroblasts from human and animals

6. PUBLICATIONS

A. PEER-REVIEWED JOURNALS

From 2016 onward:

1. Lee NM, **Erisken C**, Iskratsch T, Sheetz M, Levine WN, Lu HH*. Polymer fiber-based models of connective tissue repair and healing. ***Biomaterials*** 2017, 112: 303-312. doi: 10.1016/ j.biomaterials.2016.10.013.
2. Velioglu ZB, Pulat D, Demirbakan B, Ozcan B, Bayrak E, **Erisken C***. 3D Printed poly(lactic acid) scaffolds for trabecular bone repair and regeneration: scaffold and native bone characterization. ***Connective Tissue Research***, 2016. R*evision requested*.
3. Gurlek A, Sevinc B, Bayrak E, **Erisken C***. Synthesis and characterization of polycaprolactone for Anterior Cruciate Ligament regeneration. ***Materials Science & Engineering C: Materials for Biological Applications***, 2016. doi: 10.1016/j.msec.2016.10.071.
4. Bayrak E, Ozcan B, **Erisken C***. Cartilage-bone interface features, scaffold and cell options for regeneration. ***Journal of Tissue Science and Engineering*** 2016, 7:174. doi:10.4172/2157-7552.1000174.
5. Aksel H*, Serper A, Kalayci S, Somer G, **Erisken C**. Effects of QMix and ethylenediaminetetraacetic acid on decalcification and erosion of root canal dentin. ***Microsc Res Tech***. 2016, 79(11):1056-1061. doi: 10.1002/jemt.22745.
6. Ozcan B, Bayrak E, **Erisken C***. Characterization of human dental pulp tissue under oscillatory shear and compression. ***Journal of Biomechanical Engineering*** 2016, 138: 061006. doi: 10.1115/1.4033437
7. Bayrak E, Ozcan B, **Erisken C***. Processing of polycaprolactone and hydroxyapatite to fabricate graded electrospun composites for tendon-bone interface regeneration. ***Journal of Polymer Engineering***, 2016. doi: 10.1515/polyeng-2016-0017

Prior to 2016:

8. **Erisken C***, Kalyon DM, Zhou J, Kim SG, Mao JJ. Viscoelastic properties of dental pulp tissue and ramifications on biomaterial development for pulp regeneration. ***Journal of Endodontics*** 2015, 41(10): 1711-1717.
9. Lee CH, Rodeo SA, Fortier LA, Lu C, **Erisken C** and Mao JJ*. Protein-releasing polymeric scaffolds induce fibrochondrocytic differentiation of endogenous cells for knee meniscus regeneration in sheep. ***Science Translational Medicine*** 2014, 6(266): 266ra171.
10. Kalyon DM*, **Erisken C**, Ozkan S, Ergun-Butros A, Yu X, Wang H, Valdevit A, Ritter A. Functionally-graded polymeric graft substitutes and scaffolds for tissue engineering can be fabricated via various extrusion methods. Editorial Article. ***Journal of Tissue Science and Engineering*** 2014, 5:1.
11. **Erisken C**, Zhang X, Moffat KL, Levine WN, Lu HH*. Scaffold fiber diameter regulates human tendon fibroblast growth and differentiation. ***Tissue Engineering Part A*** 2013, 19(3-4): 519-528.
12. Senturk-Ozer S, Gevgilili H, **Erisken C**, Ward D, Kalyon DM*. Nanofibrous meshes by advanced electrospinning. ***Society of Plastics Engineers Plastics Research Online*** 2013, 4685:1-4.
13. Zhang X, Bogdanowicz D, **Erisken C**, Lee NM, Lu HH*. Biomimetic scaffold design for functional and integrative tendon repair. ***Journal of Shoulder and Elbow Surgery*** 2012, 21: 266-277.
14. **Erisken C**, Kalyon D*, Wang H, Ornek C, Xu J. Osteochondral tissue formation through adipose-derived stromal cell differentiation on biomimetic polycaprolactone nanofibrous scaffolds with graded insulin and beta-glycerophosphate concentrations. ***Tissue Engineering Part A*** 2011, 17(9-10): 1239-1252.

15. **Erisken C**, Kalyon D*, Wang H. Viscoelastic and biomechanical properties of osteochondral tissue constructs generated from graded polycaprolactone and beta-tricalcium phosphate composites. ***Journal of Biomechanical Engineering*** 2010, 132(9):091013.
16. **Erisken C**, Kalyon D*, Wang H. Functionally graded electrospun polycaprolactone and beta-tricalcium phosphate nanocomposites for tissue engineering applications. ***Biomaterials*** 2008, 29: 4065-4073.
17. **Erisken C**, Kalyon D*, Wang H. A hybrid twin screw extrusion/electrospinning method to process nanoparticle-incorporated electrospun nanofibers. ***Nanotechnology*** 2008, 19: 165302.
18. **Erisken C**, Göçmez A, Yilmazer U, Pekel F, Özkar S*. Modeling and Rheology of HTPB Based Composite Solid-Propellants. ***Polymer Composites*** 1998, 19: 463-472.
19. Göçmez A, **Erisken C**, Yilmazer U, Pekel F, Özkar S*. Mechanical and Burning Properties of Highly Loaded Composite Propellants. ***Journal of Applied Polymer Science*** 1998, 67: 1457-1464.

B. PATENTS AND INVENTION DISCLOSURES

1. Lu HH, **Erisken C**. Tissue scaffolds for controlled release of active agents, **US2013/0280318 A1**.
2. Kalyon D, **Erisken C**, Wang H. Apparatus and method to manufacture three dimensional functionally-graded scaffolds for tissue engineering applications using screw extrusion electrospinning process. Invention disclosure submitted to Stevens Institute of Technology (2006).

C. BOOK CHAPTERS

1. Subramony S, Erisken C, Chuang P, Lu HL. *Nanofiber-based integrative repair of soft tissue-to-bone interfaces,* in "Nanotechnology in Tissue Engineering and Regenerative Medicine", Ed. Ketul Popat, CRC Press, 2010.

D. CONFERENCE PROCEEDINGS AND PRESENTATIONS

1. Özcan B, Kalyon DM , Zhou J, Kim SG, Mao JJ, Erisken C. Viscoelastic Properties of Dental Pulp Tissue for Biomaterial Development, ***ASME NanoEngineering for Medicine and Biology Conference***, February 21 - 24 2016, Houston, TX.
2. Bayrak E, Özcan B, Erisken C. Processing of polycaprolactone and hydroxyapatite to fabricate graded electrospun composites for tendon-bone interface regeneration, ***ASME NanoEngineering for Medicine and Biology Conference*** 2016, Houston, TX.
3. Lee NM, Erisken C, Lu HH. Effect of randomly aligned scaffold fiber diameter on human tendon fibroblast response, ***Society for Biomaterials Proceedings***, 2013, Boston, MA.
4. Kalyon D, Ergun-Butros A, Ozkan S, Erisken C. Extrusion based processes for fabrication of bioresorbable scaffolds for tissue engineering applications, ***Proceedings of Polymer Processing Society***, May 2012: 268-269.
5. Kalyon DM, Ergun A, Ozkan S, Erisken C, Elgin E, Gevgilili H, Yu X, Wang H, Ritter A, Valdevit A. Novel methods of fabrication of scaffolds for tissue engineering, ***NY Academy of Sciences****, Chemical Engineering Approaches to Challenges in Energy and Biomedicine Meeting*, March 30, 2012, New York, NY.
6. Erisken C, Villain A, Zhang X, Lee NM, Lu HH. Modeling of release of bioactive molecules from nanofiber meshes, ***Biomedical Engineering Society Annual Meeting****,* 2011, Hartford, CT.
7. Erisken C, Zhang X, Lu HH. Controlled Release of TGF-β3 from nanofibers, its stability and bioactivity against chondrocytes, ***Orthopedic Research Society Annual Meeting****,* 2011, Long Beach, California.
8. Erisken C, Zhang X, Moffat K, Levine W, Lu HH. Scaffold fiber diameter modulates human tendon fibroblast growth and differentiation, ***Orthopedic Research Society Annual Meeting****,* 2011, Long Beach, California.
9. Subramony S, Delos D, Weber A, Erisken C, Boushell M, Zhou B, Guo XE, Deng X, Rodeo S and Lu HH; "In vivo evaluation of a mechanoactive nanofiber scaffold for integrative ACL reconstruction", ***Orthopedic Research Society Annual Meeting****,* 2011, Long Beach, California.
10. Lu HH, Erisken C. Engineering tissue-tissue interfaces via controlled scaffold design, ***Controlled Release Society Annual Meeting***, July 10-14 2010, Portland, Oregon.

11. Subramony SD, Tracey MS, Erisken C, Elasmai MY, Lu HH. Anterior cruciate ligament fibroblast response to changes in polymer nanofiber scaffold composition. ***Proceedings of IEEE Northeast Bioengineering Conference****,* 2010, New York, NY.
12. Erisken C, Zhang X, Lu HH. Effect of scaffold fiber diameter on human tendon fibroblast response, ***Society for Biomaterials Proceedings***, 2010, Seattle, WA.
13. Subramony S, Tracey M, Erisken C, Lu HH. Effect of scaffold elasticity on ligament fibroblast response, ***Society for Biomaterials Proceedings***, 2010, Seattle, WA.
14. Erisken C, Kalyon D, Wang H. Nanocomposites for tissue engineering applications engineered using a novel twin screw extrusion and electrospinning process, ***AIChE Annual Meeting*** 2007, Salt Lake City, UT.

E. INVITED LECTURES

1. Nanofiber-based biomaterials as grafts and controlled delivery systems, Department of Genetics and Molecular Biology, Bilkent University, Turkey, February 2012.
2. Composite fibrous matrices for complex tissue engineering, Department of Biomaterials and Biomimetics, New York University, New York City, NY, March 2011.
3. Electrospinning: process, modeling and applications, Biomedical Engineering, Columbia University, New York City, NY, March 2011.
4. Graded biomaterials for dental tissue engineering applications, College of Dental Medicine, Columbia University, New York City, NY, December 2010.
5. Engineering of interfaces in dentistry and orthopedics, Department of Biomaterials and Biomimetics, New York University, New York City, NY, April 2010.
6. Tissue engineering of cartilage-to-bone interfaces, Department of Biomedical Engineering, Columbia University, New York, NY, October 2008.

7. TEACHING EXPERIENCE

TOBB UNIVERSITY OF ECONOMICS AND TECHNOLOGY, ANKARA, TURKEY

BIOMEDICAL ENGINEERING DEPARTMENT (UNDERGRADUATE ONLY)

BME 309 Tissue Engineering

This course is designed to cover the basics and applications of tissue engineering as an emerging therapeutic approach to treat degenerated or damaged tissues/organs. The topics in this course include tissue engineering strategies such as the design, fabrication and utilization of biomaterials; cellular engineering including cell therapy, drug delivery; as well as cell-biomaterial interactions. Recent advances and major problems relevant to tissue engineering are also presented and discussed.

BME 311 Biomechanics

This course is designed to cover the basics and applications of biomechanics principals (i.e. kinematic, dynamic, static). The topics in this course will include skeletal muscle system, biomechanics of lower and upper extremity bones, spine biomechanics as well as cell biomechanics. More specifically, the students are expected to learn about biomechanics of bone, articular cartilage, tendons and ligaments, peripheral nerves and spinal nerve roots, skeletal muscle, knee, hip, foot and ankle, lumbar spine, cervical spine, shoulder, elbow, wrist and hand, fracture fixation, arthroplasty, and gait. Recent advances and major problems relevant to cell/tissue/organ biomechanics will also be presented and discussed.

BME 432 Biocompatibility

This course is designed to motivate student learning in the field of biocompatibility, with emphasis on understanding the ability of a material to perform with an appropriate host response in a specific situation. Biocompatibility covers the host responses to biomaterials and medical devices as well as the responses of these to physiological conditions. Therefore, cell-material interactions and the underlying mechanisms define the basics of biocompatibility. The variables that could influence the host response could be, but are not limited to, material composition, structure, morphology, crystallinity, porosity and surface chemical composition. The problems that may arise with the exposure of materials to the human body may include undesired accumulation of proteins and cells,

granulation tissue formation, immune cell responses, tumor formation material degradation leading to failure.

BME 442 Polymer based biomaterials
This course is designed to motivate student learning for the application of polymer-based biomaterials in the field of biomedical engineering, with emphasis on understanding their synthesis, processing, characterization and application. This course will cover some of the widely used synthetic and natural polymers including polylactic acid, polycaprolactone, chitosan, polyacetals, dendrimers, elastomers, degradable hydrogels, non-degradable polymers (polyethylene, polyurethane, polymethylmetacrylate), etc. During the semester we will discuss these topics in the context of polymeric biomaterials for wound healing and orthopedic tissue regeneration applications. Students will contribute to discussions through performing market search on relevant products (hydrogels), and proposing novel bioactive constructs (grafts, scaffolds) for their applications, as well as identify methods for characterization and production.

BME 530 Contemporary Subjects in Tissue Engineering
This course is designed to cover the most recent advancements in different areas of applications of tissue engineering. The topics in this course will include tissue engineering strategies such as i) compositional, structural and functional analysis of different tissues in human body, ii) design, fabrication and utilization of scaffold biomaterials and iii) cellular engineering including cell therapy, drug delivery; as well as cell-biomaterial interactions. Recent advances and major problems relevant to tissue engineering will also be presented and discussed.

BME 540 Advanced Biomaterials
This course is designed to guide students for the utilization of biomaterials in the field of biomedical engineering, with emphasis on understanding their synthesis, characterization and application. This course will cover some of the widely used biomaterials in regenerative/biomedical engineering. The students will pick up a biomaterial of their interest, and they will search for the methods of synthesis of the material, its processing to form a scaffold, implant, etc., characterization and application in biomedical engineering. They are expected to present their findings as well as to contribute to discussions in the classroom.

COLUMBIA UNIVERSITY, NEW YORK, NEW YORK

BIOMEDICAL ENGINEERING DEPARTMENT

BMEN E6001x Advanced Scaffold Design and Engineering Complex Tissues (10 students)
Dr. Erisken lectured for this course in Spring-2011 and Fall-2011 semesters on the topic of "Electrospinning: Process, modeling and applications in tissue engineering". This course provides systematic approach for advanced biomaterial selection and biomimetic scaffold design for tissue engineering and regenerative medicine. It also involves formulation of bio-inspired design criteria, scaffold characterization and testing, and applications on forming complex tissues or organogenesis.

NEW YORK UNIVERSITY, NEW YORK, NEW YORK

DEPARTMENT OF BIOMATERIALS AND BIOMIMETICS

Bioceramics G17.1003 (35 students)
Dr. Erisken lectured for this course in Spring-2010 and Spring-2011 semesters on the topics of "Fabrication of functionally graded composite scaffolds for tissue engineering applications" and "Polymer-ceramic nanofibrous composite matrices for complex tissue engineering", respectively. The course is structured to train students in the fundamentals of composite biomaterials, their fabrication, uses as bone substitutes, and application for the engineering of bony tissues.

STEVENS INSTITUTE OF TECHNOLOGY, HOBOKEN, NEW JERSEY

CHEMICAL & BIOMEDICAL ENGINEERING DEPARTMENT

ChE 210 Chemical Process Analysis (40 students)
Assisted in the preparation of course materials and tutored problem solution sessions, evaluated homework assignments, mid-terms and final examinations. This course aims at giving an introduction to the most important processes employed by the chemical industries, such as biochemical, pharmaceutical, plastics, chemical, and petrochemical. The major emphasis is on formulating and

solving material and energy balances for simple and complex systems. Equilibrium concepts for chemical process systems are developed and applied.

ChE 432 Chemical Engineering Laboratory (24 students)

Taught, supervised and evaluated lab sessions on unit operations including distillation, crystallization, fluid flow dynamics, principles and operation of shell and tube heat exchangers. It is a laboratory course designed to illustrate and apply chemical engineering fundamentals. The course covers a range of experiments involving mass, momentum and energy transport processes and basic unit operations.

MIDDLE EAST TECHNICAL UNIVERSITY, ANKARA, TURKEY

DEPARTMENT OF CHEMICAL ENGINEERING

ChE 352 Heat Transfer Operations (50 students)

Assisted in the preparation of course materials and tutored problem solution sessions, evaluated homework assignments, mid-terms and final examinations. This course provides fundamental molecular mechanisms of heat transfer described by Fourier's law. Also provided are transport of heat in turbulent regime, heat transfer by radiation, and heat transfer to fluids with phase change.

8. MENTORING EXPERIENCE

TOBB UNIVERSITY OF ECONOMICS AND TECHNOLOGY, ANKARA, TURKEY

BIOMEDICAL ENGINEERING DEPARTMENT

Burak Özcan (2015-) – BME Graduate Student
Ece Bayrak (2015-) – BME Graduate Student
Zeynep Mutlu (2015-2016) – BME Undergraduate Student
Abdullah Eyidoğan (2015-2016) – BME Undergraduate Student

COLUMBIA UNIVERSITY, NEW YORK, NEW YORK

BIOMEDICAL ENGINEERING DEPARTMENT

Xin Zhang (2009-2012) – BME Undergraduate Student
Nancy Lee (2010-2011) – BME Graduate Student
Arthur Villain (2011 Summer) – Undergraduate Student, Université René Descartes Medical School, France

STEVENS INSTITUTE OF TECHNOLOGY, HOBOKEN, NEW JERSEY

CHEMICAL AND BIOMEDICAL ENGINEERING DEPARTMENT

Daniel Buehring (2007) – ChemE Undergraduate
Weihong Teo (2007) – ChemE Undergraduate
Wei Liao (2007) – ChemE Undergraduate
Robert Afferi (2007- 2008) – ChemE Undergraduate Student
Oguz Caniaz (2008 Summer) – ChemE Undergraduate Student, Middle East Technical University, Turkey