



UNIVERSITÀ DI PISA  
**DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE**  
**Dottorato di Ricerca in Ingegneria dell'Informazione**

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Doctoral Course

**“Introduction to Bioprinting”**

Prof. Thomas Boland

*Biomedical Engineering, Border Biomedical Research Center (BBRC), University of El Pas (UTEP), Texas, USA*

**Short Abstract:**

Bioprinting is an inherently cross-disciplinary scientific field that focuses on computer aided processes for manufacturing biomedically relevant products. These processes lead to products that may involve living (cells and/or tissues) and nonliving (bio-supportive proteins, scaffolds) components. The course introduces students to cell printing, patterning, assembling, 3D scaffold fabrication, cell/tissue-on-chips as a coherent micro-/nano-fabrication toolkit. Real-world examples illustrate how to apply bioprinting techniques in areas such as regenerative medicine, pharmaceuticals and tissue engineering

**Course Contents in brief:**

- In Vitro Bioprinting of Tissues and Organs (3h)
- Biomaterials for Biofabrication of 3D Tissue Scaffolds (3h)
- Fabrication of Microscale Hydrogels for Tissue Engineering Applications (3h)
- Polymeric Membranes for the construction of Tissues and Organs (3h)
- Laser-Assisted and other Bioprinting tools for Tissue Engineering (3h)
- Modular Tissue Engineering (3h)
- Formation of Multicellular Microtissues and Applications in Bioprinting (3h)
- Breast Reconstruction Using Biofabrication-Based Tissue Engineering Strategies (3h)

**Total # of hours of lecture:** 24 hours

**References:**

[1] Biofabrication 1st Ed. 2013 Micro- and Nano-fabrication, Printing, Patterning and Assemblies  
Editors: Gabor Forgacs Wei Sun, Elsevier, Hardcover ISBN: 978-1-45-572852-7

[2] Essentials of 3D Biofabrication and Translation 2015. Editors: Anthony Atala and James J. Yoo,  
Elsevier, ISBN 978-0-12-800972-7

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## CV of the Teacher

**THOMAS BOLAND** is a Professor in the Department of Metallurgy, Materials and Biomedical Engineering at the University of Texas at El Paso. He also serves as the director of UTEP's Biomedical Engineering Programs. He received his B.S. in Chemical Engineering from the Ecole Nationale Supérieure d'Ingénieurs de Genie Chimique in Toulouse, France in 1990, and his Ph.D. in Chemical Engineering from the University of Washington, Seattle, WA in 1995. In 1994, he was a finalist for the Materials Research Society Graduate Student Award. Following his Ph.D., he was a Postdoctoral Fellow at Department of Materials Science at the Pennsylvania State University from 1995-1997, and at the Naval Research Laboratory from 1997-1999. In 1999, he joined Clemson University as Assistant Professor, where he received tenure in 2005. He holds an adjunct appointment as Professor at the Texas Tech University Foster School of Medicine.

Thomas' research interests are applying engineering principles to automate, predict and build three dimensional structures with that show biological function. He has received numerous awards and was featured on CNN and the Discovery Channel for his ground braking innovations using inkjet printers to assemble cells and biomaterials into viable and functioning structures. He is the author of more than 110 publications, has more than 7,400 citations and an H factor of 35.

He is the co-founder and Chief Science Officer of Tevido, LLC, a UTEP spin-off, has four issued patents and two pending, two licensed, and two generating revenue. He is the author of two recent books chapters "Organ Printing" in: *Biomaterials and Regenerative Medicine*" Cambridge Univ Press (2013) and *Inkjet printing of biopolymers and cells."* in: *Inkjet technology for digital fabrication"*, Wiley-Blackwell, (2012), seven review and perspective articles on inkjet printing for biomedical applications, five keynote lectures at dedicated conferences and 35 keynote/invited lectures. He serves as the editor of *Journal of Medical Engineering* the founder and co-Editor of *IOP journal Biofabrication*, (2019 Impact Factor: 7.2. He has received over \$44.8 million in research funding as PI or co-PI.

He is the founder Biomedical Engineering at UTEP. Developed the first PhD curriculum in the nation with a unifying research theme of research and engineering for low resource settings. He has hired one faculty member into Biomedical Engineering, mentored a female executive to become CEO of a biotech startup. He has been extensively involved with service outside of his institution, having served on an NSF site visit panels: for National Nanotechnology Infrastructure Network, and Science and Technology Centers.

## Room and Schedule

Room: *Aula Riunioni del Dipartimento di Ingegneria dell'Informazione, Via G. Caruso 16, Pisa – Ground Floor*

Schedule:

- Wednesday 29th January, 14:30 – 17:30
- Friday 31st January, 14:30 – 17:30
- Wednesday 5th February, 14:30 – 17:30
- Friday 7th February, 14:30 – 17:30
- Wednesday 12th February, 14:30 – 17:30

- Friday 14th February, 14:30 – 17:30
- Wednesday 19th February, 14:30 – 17:30
- Friday 21st February, 14:30 – 17:30