

CURRICULUM VITAE

JUAN F. VIVANCO, PH.D.

Associate Professor

Facultad de Ingeniería y Ciencias
Centro de Bioingeniería – Viña del Mar
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OBJECTIVE

My teaching objectives are to expose engineering students to non-traditional applications of engineering design with interfaces between bioengineering, orthopedic medicine, and mechanical/materials engineering; and inspire under-represented students to pursue engineering majors. My research goal is to develop strategies to value the use of natural and artificial biomaterials for potential biotechnological and biomedical applications. For that, I have established a multiscale and integrative technological platform of experimental biomechanical models, *in vitro* biological models and computational models. My research projects include basic science research as well as applied industry projects.

EDUCATION

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| 12/2011 | UNIVERSITY OF WISCONSIN-Madison, USA
Ph.D. in Materials Science (Biomechanics Emphasis)
Thesis: “Investigation of Fabrication and Environmental Effects on Bioceramic Bone Scaffolds”. |
| 05/2007 | UNIVERSITY OF WISCONSIN-Madison, USA
M.Sc. in Materials Science
Thesis: “The Mechanical Behavior of a Direct Compression Molded Porous Tantalum-UHMWPE Construct: A Microstructural Model”. |
| 05/2006 | UNIVERSITY OF WISCONSIN-Madison, USA
M.Sc. in Mechanical Engineering
Course-based degree. |
| 12/2005 | UNIVERSITY OF WISCONSIN-Madison, USA.
M.Sc. in Civil Engineering
Thesis: “The Transition to a Performance Grading System for Asphalt Binders in South America”. |
| 12/2000 | UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA, Chile.
B.Sc. and Professional Degree in Civil Engineering
Thesis: “Fragility in Concrete Pavement Structures through Fracture Mechanics”. |
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ACADEMIC APPOINTMENTS

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| 08/2014 – present | ADOLFO IBÁÑEZ UNIVERSITY – Chile
Faculty of Engineering and Sciences – Bioengineering
Associate Professor 01/2018 – present
Assistant Professor 08/2014 – 01/2018
Chair of Bioengineering (undergraduate program) 08/2015 – 12/2017
Teaching: <ul style="list-style-type: none">– Courses in Bioengineering: Biomaterials, Biomechanics.– Courses in Civil and Mechanical Engineering: Mechanics of Materials, Materials Science.– Courses in Industrial Engineering: Technology Innovation, Capstone Projects. Research: <ul style="list-style-type: none">– Group Director 08/2014 - present
Research Group: “Biological, Bioinspired and Biomaterials” B3MAT
https://www.b3matchile.com/ |
| 01/2013 – 07/2014 | UNIVERSITY OF WISCONSIN-Madison – USA
Associate Lecturer - College of Engineering <ul style="list-style-type: none">– <i>Introduction to Engineering Design</i>: approximately 30 freshman students from the college of engineering to provide the students with first-hand experience working in teams on a design project for real-world clients. Lectured. |

- 01/2012 – 07/2014 UNIVERSITY OF WISCONSIN-Madison - USA
Research Associate – Post-Doctoral Training
 • *Dept. of Mechanical Engineering/Materials Science*
 – Research Interests: silver nano particles on bone cement for joint replacements; nanomechanical properties of bone tissue; loading on trabecular bone; bone bioreactor and loading system.
- 01/2004 – 12/2011 UNIVERSITY OF WISCONSIN-Madison - USA
Graduate Research Assistant
 • *Dept. of Mechanical Engineering 01/2006 – 12/2011*
 Bone and Joint Biomechanics Laboratory & Polymer Center.
 – Research Interests: bioceramic bone scaffolds; multi-scale mechanical/material characterization; orthopedic implants; *ex-vivo* bone loading and culture system; finite element simulation.
 • *Dept. of Civil Engineering 01/2004 – 12/2005*
 – Research Interests: Superpave-technology testing on asphalt/polymeric materials.
- 12/2000 – 01/2004 UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA - Chile
Academic Instructor (Full Time Lecturer), Dept. of Civil Engineering
 – Courses in Civil Engineering/Construction Engineering: Strength of Materials, Static of Structures, Intro. to Civil Engineering; Structures I, Structures II.
 – Head of the academic undergraduate program of Civil Engineering.
- 03/1996 – 12/2000 UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA - Chile
Coordinator of Teaching Assistants, Dept. of Physics
 – *General Physics*: trained junior teaching assistants; developed problem sets and experimental work.
Teaching Assistant:
 – Dept. of Physics: *General Physics; Classical Mechanics; Optics; and Thermodynamics*. Lecturer, performed experimental work, developed problem sets, and graded.
 – Dept. of Civil Engineering: *Strength of Materials; Static of Structures; Steel Structures; Tridimensional Geometry*. Lecturer, performed experimental work, developed homework, and graded.

HONORS AND AWARDS

- **Best Poster Presentation Award.** Research work presented by Raúl Vallejos (postdoctoral researcher) at the 28th Annual Congress of the European Orthopaedic Research Society (online-EORS), Turkish. 2020.
- **Ambassador of Viña del Mar City.** Named by the City Hall of Viña del Mar to represent the city in key areas of knowledge and education and to promote it as a host for future events. Viña del Mar, Chile. 2018.
- **Best Researcher in the area of Engineering and Technology.** Adolfo Ibáñez University, Chile. 2017.
- **Outstanding Contribution in Research.** Faculty of Engineering and Sciences, Adolfo Ibáñez University, Chile. 2014.
- **Honorary Fellow.** Department of Mechanical Engineering, University of Wisconsin-Madison. 2014.
- **Future Leaders Program.** Nominated for the American Ceramic Society in recognition of exemplary work and potential as a future leader in the ceramics and glass industry. 4th Ceramic Leadership Summit, Baltimore, Maryland. 2014.
- **International Student Academic Achievement Award.** Wisconsin Alumni Association, in recognition of exceptional academic performance and achievements after completing doctoral degree at the University of Wisconsin-Madison. 2012.
- **President of the Republic Scholarship.** Full tuition and expenses for doctoral studies in USA, Chilean Government. 2005-2009.
- **Vilas Travel Grant.** Graduate School of the University of Wisconsin-Madison. 2011.
- **Graduate Research Assistantship.** Dept. of Mechanical Engineering, University of Wisconsin-Madison. 2006-2011.
- **Graduate Research Assistantship.** Dept. of Civil Engineering, University of Wisconsin-Madison. 2004-2005.
- **Eduardo Neale Silva Scholarship.** Full tuition and expenses for outstanding Chilean students for one year at the University of Wisconsin-Madison. 2004.
- **Federico Santa María Scholarship.** Full tuition and expenses for outstanding undergraduate academic performance, Universidad Técnica Federico Santa María, Valparaíso, Chile. 1993-1998.

INDUSTRIAL WORK

- 08/2014 – present **Consulting in Mechanical/Bio Engineering**
 – Worked as a project engineer in mechanical and material engineering projects.
- 05/2007 – 12/2007 ZIMMER, INC., Warsaw IN - USA
Intern Engineer: Structural Design and Analysis Research Group
 – Research: “Tantalum-UHMWPE orthopedic implants”; microstructural model of a porous structure using FEA.
- 01/2000 – 01/2007 **Consulting in Civil Engineering**
 – Worked as a project engineer in structural and solid mechanics engineering projects.

GRANT SUPPORT

Total Awards as PI: US\$1,201,400; B3MAT-Lab Allocation: US\$451,400

CURRENT

- [1] 07/2021 – Intramural Research Grant – To hire a Postdoctoral Researcher
06/2022
Granted by Faculty of Engineering and Sciences, Adolfo Ibáñez University
Role: Sponsor – US\$ 29,000
- [2] 12/2020 – Research Seed Funds Program
12/2021
Granted by Faculty of Engineering and Sciences, Adolfo Ibáñez University
Role: Principal Investigator – US\$20,000

COMPLETED

- [3] 03/2019 – Research and Development Agreement – Empa (Switzerland)/UAI
02/2021
Empa Contract No 2020-063-C01
“Development and Characterization of PCL-Bioactive Glass-Ceramic Composite-based Bio-Scaffolds for Bone Tissue Applications: a Pilot Study”.
Role: Principal Investigator (Chilean counterpart) – US\$ 68,000
- [4] 01/2018 – ANILLO – Collaborative Research Program
06/2021
Associative Research Program to promote research of excellence in Chile
“Integrating Structure and Function of Ecological, Mechanical and Mineralogical Properties of Marine Calcifiers: Shell Carbonate as Source of Bio-Inspiration (Carbo-Nat-Lab)”
Role: Principal Investigator (Director: Nelson Lagos) – US\$ 750,000 (US\$160,000 lab allocation)
- [5] 11/2017 – FONDECYT – Initiation for Research
11/2020
Chilean National Fund for Scientific and Technological Development
“Design and Evaluation of Porous Scaffolds for Bone Regeneration: Development of a Biomechanical Platform”
Role: Principal Investigator - US\$ 150,000
- [6] 03/2018 – Intramural Research Grant – To hire a Postdoctoral Researcher
12/2018
Granted by Vicerrectoría Académica, Adolfo Ibáñez University
Role: Principal Investigator – US\$ 23,000
- [7] 03/2018 – Intramural Research Grant – Undergraduate Student Research Training Program
12/2018
Granted by Vicerrectoría Académica, Adolfo Ibáñez University
Role: Principal Investigator – US\$ 1,400
- [8] 07/2015 – A new engineering for 2030 program – CORFO
05/2017
Granted by Adolfo Ibáñez University, Faculty of Engineering and Sciences
“Bioengineering-based Materials: Multiscale Modeling and Experimentation”
Role: Principal Investigator – US\$ 70,000
- [9] 07/2013- University of Wisconsin Graduate School
07/2014
“Silver-Doped Antimicrobial Bone Cement for Use in Total Joint Replacement”
Role: Principal Investigator (Sponsor: Heidi-Lynn Ploeg) – US\$ 70,000
- [10] 01/2012- Universidad Técnica Federico Santa María
12/2012
“Efecto de las Temperaturas de Sinterización de los Implantes Óseos”
Role: Principal Investigator - International collaborator – US\$ 20,000
- [11] 07/2010- University of Wisconsin Graduate School
07/2011
“Characterizing the Mechanical and Biological Properties of Seeded Bone Scaffolds”
Role: Co-Investigator (PI: Dr. Heidi-Lynn Ploeg) – US\$ 50,000
- [12] 07/2009- University of Wisconsin Graduate School
07/2010
“Control and Data Management System for a Live Bone Loading Apparatus”
Role: Pre-doctoral Trainee (mentor: Everett Smith) – US\$ 50,000

PATENTS

- [1] Orthopedic Component of Low Stiffness - 07-30-2009
Inventors: Clarence M. Panchison, Alicia Rufner, Archie W. Newsome Kirt L, Case Zhibin Fang, Juan Vivanco, Oludele O. Popoola, Robby Kissling, Brion R. Mimnaugh, Dirk L. Pletcher, Randy L. Schlemmer. IPC8 Class: AA61F228FI, USPC Class: 623 1611.
- [2] Medical Implants and Methods for Delivering Biologically Active Agents - 04-30-2009
Inventors: Zhibing Fang, Yang W. Son, Juan Vivanco, Kai Zhang, Danny L. Levine. IPC8 Class: AA61F202FI, USPC Class: 623 1111.

PUBLICATIONS

Journal Articles (peer-reviewed)

- [1] Vallejos R., Contreras J., Millán C., Burda, I., Terrasi, G., Siqueira, G., Weisse, B., Palza, H., Nyström, G., Aiyangar. A., Vivanco J.F. “Shape Fidelity, Mechanical and Biological Performance of 3D Printed Polycaprolactone-Bioactive Glass Composite Scaffolds” *Materials Science and Engineering C: Materials for Biological Applications*. 123 (112540). **2021**.
- [2] Vallejos R., Contreras J., Toro C., Bustamante M., Pérez L., Aiyangar A., Vivanco J.F., “Structure-Function Assessment of 3D-Printed Porous Scaffolds by a Low-Cost/open-source Fused Filament Fabrication Printer” *Materials Science and Engineering C: Materials for Biological Applications*. 123 (111945). **2021**.
- [3] García-Huidobro R., Poupin M.J., Urrutia C., Rodriguez-Navarro A., Grenier C., Vivanco J.F., Ramajo L., Benjumeda I., Lagos N.A., Lardies M.A. “An Intrapopulation Study of Organic Compounds and Biomechanical Properties of the Shell of the Antarctic Bivalve *Laternula Elliptica* (P. P. King, 1832) at King George Island”. *Polar Biology*. **2021**.
- [4] Lagos N.A., Benítez S., Grenier C., Rodriguez-Navarro A., García C., Abarca A., Vivanco J.F., Benjumeda I., Vargas C., Duarte C., Lardies M.A. “Plasticity in Organic Composition Maintain Biomechanical Performance in Shells of Juvenile Scallops Exposed to Reduced pH and Elevated Temperature” *Scientific Reports*. **2021**.
- [5] Benjumeda W., Vallejos R., Santibanez J., Millán C., Vivanco J.F. “Analysis of cell-biomaterial interaction through cellular bridge formation in the interface between hGMSCs and CaP bioceramics” *Scientific Reports*. **2020**.
- [6] Norambuena-Contreras J., Arteaga-Perez L., Guadarrama-Lezama A., Briones R., Vivanco J.F., Gonzalez-Torre I. “Microencapsulated Bio-Based Rejuvenators for the Self-Healing of Bituminous Materials”. *Materials*. 13(6) 1446. **2020**.
- [7] Vallejos R., Irribarra V., Benjumeda-Wijnhoven I., Millán C., Vivanco J.F. “Microporosity Clustering Assessment in Calcium Phosphate Bioceramic Particles”. *Frontiers in Bioengineering and Biotechnology*. **2019**.
- [8] Vukasovic T., García C., Vivanco J.F., Celentano D. “Characterization of the Mechanical response of thermoplastic parts fabricated with 3D printing”. *The International Journal of Advanced Manufacturing Technology*. 104: 4207–4218. **2019**.
- [9] Millán C., Vivanco J.F., Benjumeda-Wijnhoven I.M., Bjelica S., Santibáñez J.F. “Mesenchymal Stem Cells and Calcium Phosphate Bioceramics: Implications in Periodontal Bone Regeneration”. *Advances in Experimental Medicine and Biology*. Springer. **2018**.
- [10] Ruggeri F., Leiva V., Saulo H., Vivanco J.F., “A Methodology Based on the Birnbaum-Saunders Distribution for Reliability Analysis Applied to Nano-materials”. *Reliability Engineering & System Safety*. **2017**.
- [11] Slane J., Vivanco J.F., Squire M., Ploeg H.L., “Characterization of the Quasi-Static and Viscoelastic Properties of Orthopaedic Bone Cement at the Macro and Nanoscale”. *Journal of Biomedical Materials Research: Part B Applied Biomaterials*. **2016**.
- [12] Norambuena-Contreras J., Gonzalez-Torre I., Vivanco J.F., Gacitúa W., “Nanomechanical Properties of Polymeric Fibres Used in Geosynthetics Composites”. *Polymer Testing*. **2016**.
- [13] Burgers T., Vivanco J.F., Bart W., “Mice with a Heterozygous Lrp6 Deletion Have Impaired Fracture Healing”. *Bone Research*. **2016**.
- [14] Meyer L, Johnson M., Cullen D., Vivanco J.F., Blank R., Smith E., Ploeg H.L. “Combine Exposure to Big Endothelin-1 and Mechanical Loading in Bovine Sternal Cores Promotes Osteogenesis”. *Bone*. **2016**.
- [15] Marchant C., Leiva V., Cysneiros F., Vivanco J.F., “Multivariate Birnbaum-Saunders Regression Models: Diagnostic Analysis and Application” *Journal of Applied Statistics*. **2016**.
- [16] Collins C., Vivanco J.F., Burgers T., Ploeg H.L. “Fracture Healing in Mice Lacking Pten in Osteoblasts: A Micro-Computed Tomography Image-Based Analysis of the Mechanical Properties of the Femur”. *Journal of Biomechanics*. 48(2): 310-317. **2015**.
- [17] Slane J., Vivanco J.F., Squire M., Ploeg H.L. “Mechanical, Material, and Antimicrobial Properties of Acrylic Bone Cement Impregnated with Silver Nanoparticles” *Materials Science and Engineering C: Materials for Biological Applications*. 48: 188-196. **2015**.

- [18] Vivanco J.F., Burgers T., García S., Ploeg H.L. “Estimating the Density of Human Trabecular Bone Using Clinical CT Scan Data”. *Journal of Engineering in Medicine*. 228: 616-626. **2014**.
- [19] Vivanco J.F., Jakes J., Slane J., Ploeg H.L. “Accounting for Structural Compliance in Nanoindentation Measurements of Bioceramic Bone Scaffolds”. *Journal of Ceramics International*. **2014**.
- [20] Slane J., Vivanco J.F., Ploeg H.L., Squire M. “The Influence of Low Concentration a Water Soluble Porogen on the Material Properties, Antibiotic Release, and Biofilm Inhibition of an Acrylic Bone Cement”. *Materials Science and Engineering C: Materials for Biological Applications*. 42:168-176. **2014**.
- [21] Aiyangar A., Vivanco J.F., Au, A., Smith E., Ploeg H.L. “Axial and Transverse Compressive Properties of Human Lumbar Vertebral Trabecular Bone”. *Journal of Biomechanical Engineering*. **2014**.
- [22] Slane J., Vivanco J.F., Ebenstein D., Squire M., Ploeg H.L. “Multiscale Characterization of Acrylic Bone Cement Modified with Functionalized Mesoporous Silica Nanoparticles”. *Journal of Mechanical Behavior of Biomedical Materials*. 37:141-152. **2014**.
- [23] Slane J., Vivanco J.F., Meyer J., Ploeg H.L., Squire M. “Modification of Acrylic Bone Cement with Mesoporous Silica Nanoparticles: Effects on Mechanical, Fatigue and Absorption Properties”. *Journal of Mechanical Behavior of Biomedical Materials*. 29: 451-461. **2014**.
- [24] Vivanco J.F., García S., Ploeg H.L., Alvarez G., Cullen D., Smith E. “Apparent Elastic Modulus of Ex Vivo Trabecular Bovine Bone Increases with Dynamic Loading”. *Journal of Engineering in Medicine*. 27(8): 902-910. **2013**.
- [25] Vivanco J.F., Aiyangar A., Araneda A., Ploeg H.L., “Mechanical Characterization of Injection-Molded Macro Porous Bioceramic Bone Scaffolds”. *Journal of Mechanical Behavior of Biomedical Materials*. 9:137-152. **2012**.
- [26] Vivanco J.F., Araneda A., Ploeg H.L., “The Effect of the Sintering Temperature on Microstructural Properties of Bioceramic Bone Scaffolds”. *Biomaterials Science: Processing, Properties and Applications II. John Wiley & Sons, Inc*. 101-109. **2012**.
- [27] Vivanco J.F., Slane J., Nay R., Simpson A., Ploeg H.L., “The Effect of Sintering Temperature on the Microstructure and Mechanical Properties of a Bioceramic Bone Scaffold”. *Journal of Mechanical Behavior of Biomedical Materials*. 4:2150-60. **2011**.
- [28] Vivanco J.F., Smith B., Blake A., Ploeg H.L., Turner K. “3D Elastomeric Scaffolds- Fabricated by Casting in Micro End Milled Molds”. *Journal of Biomimetics, Biomaterials and Tissue Engineering*. 9:17-23. **2011**.
- [29] Vivanco J.F., Fang Z., Levine D., Ploeg H.L. “Evaluation of the Mechanical Behavior of a Direct Compression Molded Porous Tantalum-UHMWPE Construct: a Microstructural Model”. *Journal of Applied Biomaterial and Biomechanics*. 7: 34-42. **2009**.
- [30] Vivanco J.F., Fang Z., Levine D., Ploeg H.L. “Microstructural Mechanical FE Analysis of Compression Molded Porous Tantalum-UHMWPE”. *Journal of Biomechanics*. **2008**.

Conference Publications

- [1] Benjumeda I., Ebenstein D., Ramajo L., Millán C., Vivanco J.F. “Nanomechanical Evaluation Of Argopecten Purpuratus Under Upwelling Scenarios” 26th Congress of the European Society of Biomechanics (ESB), (virtual conference). Milan, Italy July **2021**.
- [2] Funk J.V., Kunath B., Vivanco J.F., Ploeg H.L., “FEA Simulation of Parametric Trabecular Bone Scaffolds”, Orthopaedic Research Society (ORS 2021) Annual meeting (virtual conference), February **2021**.
- [3] Labra F.A., San Martín V., Jahnsen N., Fernández C., Zapata J., Duarte C., García C., Vivanco J.F., Lagos N.A., Lardies M.A. “Modelling the effect of environmental variation in multiple stressors on physiological traits of the intertidal ecosystem engineer *Perumytilus purpuratus* (Lamarck 1810) along a geographical ocean acidification gradient in the South Eastern Pacific”. Festival of Ecology from British Ecological Society (virtual conference). December **2020**.
- [4] Benjumeda I., Lardies M.A., Lagos N., Ploeg H.L., Vivanco J.F. “Micromechanical Analyses of Argopecten Purpuratus Exposed to a Climate Change Scenario by Depth Sensing Indentation”. Festival of Ecology from British Ecological Society (virtual conference). December **2020**.
- [5] Vallejos R., Contreras J., Aiyangar A., Palza H., Vivanco J.F. “Effect of 45S5 Bioglass on the Mechanical and Biological Performance of 3D Printed PCL Scaffolds”. European Orthopaedic Research Society (EORS) 28th Annual Meeting (virtual conference). Turkey, September **2020**.
- [6] Vallejos R., Contreras J., Toro C., Ploeg H., Pérez L., Vivanco J.F. “Biomechanical Evaluation of low-cost 3D Printed Scaffolds as in vitro Tissue Engineering Models”. European Orthopaedic Research Society (EORS) 28th Annual Meeting (virtual conference). Turkey, September **2020**.
- [7] Benjumeda I., Millán C., Muñoz A., Lardies M., Ploeg H., Vivanco J.F. “Marine Biomaterials for Bone Tissue Regeneration: a Biocompatible evaluation with Stem Cells”. European Orthopaedic Research Society (EORS) 28th Annual Meeting (virtual conference). Turkey, September **2020**.

- [8] Urrutia F., Vallejos R., Ploeg H., Aiyangar A., Vivanco J.F. "Mechanical evaluation of 3D-printed scaffolds: A 3³ full-factorial analysis of geometrical parameters". International Society of Biomechanics (ISB), Calgary, Canada, August **2019**.
- [9] Benjumeda I., Millán C., Vivanco J.F., "Microarchitecture of Calcium Phosphate Bioceramics as a Determinant Parameter for in vitro Osteogenic Differentiation of Human Gingival Mesenchymal Stem Cells". 8th World Congress of Biomechanics (WCB), Dublin, Ireland, July **2018**.
- [10] Abarca A., García C., Vivanco J.F., Lagos N., Lardies M., "Mechanical Behavior on Shell Characteristics of the Juvenile Scallops (*Argopecten purpuratus*) Subject to Climate Change Scenarios". 8th World Congress of Biomechanics (WCB), Dublin, Ireland, July **2018**.
- [11] Vivanco J.F., Aiyangar A., Ploeg H., "Bioactivity of a Macro-porous Bioceramic Bone Scaffold Fabricated at Two Sintering Temperatures". 8th World Congress of Biomechanics (WCB), Dublin, Ireland, July **2018**.
- [12] Irribarra V., Chen Z., Benjumeda I., Palza H., Millán C., Vivanco J.F., "Analysis of Mesenchymal Stromal Cells in Combination with Bioglass as a Structural and Functional Basis for Bone Tissue Engineering". 1st National Congress of Tissue Engineering and Regenerative Medicine, Santiago, Chile, November, **2017**.
- [13] Vivanco J.F., Benjumeda I., Irribarra V., Millán C., "Ca-P Bioceramics as Bioactive Support for Human Gingival Mesenchymal Stem Cell Osteogenic Differentiation in vitro". 2017 Annual Meeting & Exposition of the Society for Biomaterials, Minneapolis, MN, April **2017**.
- [14] Vivanco J.F., "Characterization of Multiscale Material Properties of Bioceramic Bone Scaffolds". 7th International Conference on Multiscale Modelling and Methods: Upscaling in Engineering and Medicine, Santiago, Chile, January **2017**.
- [15] Vivanco J.F., Ploeg H., "Bioactivity and Biomechanical Characterization of Bioceramic Bone Scaffolds". 14th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (CMBBE), Tel Aviv, Israel, September **2016**.
- [16] Meyer L., Vivanco J.F., Ploeg H., "Multi-scale Mechanical Analysis of Injection Molded Beta Tricalcium Phosphate Bone Scaffolds". 13th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (CMBBE), Montreal, Canada, September **2015**.
- [17] Vivanco J.F., Slane J., Aiyangar A., Ploeg H., "Multiscale Properties of a Macro-Porous Bioceramic Bone Scaffold Fabricated at Two Sintering Temperatures". 7th World Congress of Biomechanics (WCB), Boston, MA, July **2014**.
- [18] Slane J., Vivanco J., Squire M., Ploeg H., "Silver-Doped Antimicrobial Bone Cement for use in Total Joint Replacement". 7th World Congress of Biomechanics (WCB), Boston, MA, July **2014**.
- [19] Collins C., Skon S., Burgers T., Vivanco J., Ploeg H. "Fracture Healing in Mice Lacking Pten in Osteoblasts: A Micro-Computed Tomography Image-Based Analysis of Bone Strength". 7th World Congress of Biomechanics (WCB), Boston, MA, July **2014**.
- [20] Meyer L., Johnson M., Vivanco J., Ploeg H., Cullen D., Smith E. "Mechanical Loading and Exposure to Big Endothelin-1 Increases Bone Formation in Ex Vivo Bovine Trabecular Cores". 7th World Congress of Biomechanics (WCB), Boston, MA, July **2014**.
- [21] Vivanco J., Slane J., Ploeg H., Crenshaw T. "Regional Differences in the Nanoscale Static and Creep Properties of Porcine Bone Subjected to Different Dietary Conditions". 3rd Global Congress on NanoEngineering for Medicine and Biology (NEMB), San Francisco, CA, February **2014**.
- [22] Slane J., Vivanco J., Ploeg H., Squire M. "The Dynamic and Static Properties of an Acrylic Bone Cement Modified with Mesoporous Silica Nanoparticles". 5th International Conference on Mechanics of Biomaterials and Tissues, Sitges, Spain, December **2013**.
- [23] Cullen D., Alvarez G., Johnson M., Vivanco J., Ploeg H., Smith E. "Mechanical Loading and Big Endothelin-1 in Trabecular Bone Cores". American Society of Bone and Mineral Research (ASBMR), Baltimore, MD, October **2013**.
- [24] Aiyangar A., Vivanco J., Au A., Anderson P., Smith E., Ploeg H. "Dependence of Human Lumbar Vertebral Trabecular Bone Mechanical Anisotropy Ratio on QCT-Based Apparent Density. Proceedings of the American Society of Mechanical Engineering- Summer Bioengineering Conference, Sunriver, OR, June **2013**.
- [25] Vivanco J., Aiyangar A., Collins C., Ploeg H. "Bioactivity of Bioceramic Bone Scaffolds Fabricated at Two Sintering Temperature". Proceeding of the Innovations in Biomedical Materials, Raleigh, NC, September **2012**.
- [26] Meyer L., Johnson M., Vivanco J., Ploeg H., Blank R., Smith E. "Exposure to Big Endothelin-1 in Bovine Sternal Cores Mimics Some Aspects of Mechanical Loading". American Society for Bone and Mineral Research (ASBMR), Minneapolis, MN, October **2012**.
- [27] Vivanco J., Aranedá A., Ploeg H. "Effect of the Sintering Temperature on Microstructural Properties of a Bioceramic Bone Scaffold". Proceeding of the Materials Science & Technology Conference (MS&T), Columbus, OH, October **2011**.

- [28] Vivanco J., Slane J., Ploeg H. “Nano-mechanical properties of bioceramic bone scaffolds fabricated at three sintering temperatures”. Proceedings of the American Society of Mechanical Engineering- Summer Bioengineering Conference, Farmington, PA, June **2011**.
- [29] Vivanco J., García S., Smith, E., Ploeg H. “Dynamic Loading Increases Apparent Elastic Modulus of Ex Vivo Trabecular Bovine Bone”. American Society for Bone and Mineral Research (ASBMR), Toronto, Canada, October **2010**.
- [30] Vivanco J., Smith B., Blake A., Ploeg H., Turner K. “3D Elastomeric Scaffolds- Fabricated by Casting in Micro End Milled Molds”. Proceedings of the 5th International Conference on MicroManufacturing (ICOMM/4M), Madison, WI, April **2010**.
- [31] Vivanco J., Garcia-Rodriguez S., Smith E., Ploeg H. “Material and Mechanical Properties of Tricalcium Phosphate-based (TCP) Scaffolds”. Proceedings of the American Society of Mechanical Engineering- Summer Bioengineering Conference, Lake Tahoe, CA, June **2009**.
- [32] Fang Z., Vivanco J., Rufner A., Levine D., Johnson T. “The Effect of Poly Thickness on Contact Stress in low Stiffness Porous Metal-backed Acetabular Component: Is 4mm minimum thickness poly a gold standard?” Orthopaedic Research Society, 54th annual meeting, San Francisco, CA, **2008**.

Peer reviewed book chapters

- [1] Millán C., Vivanco J.F., Benjumeda-Wijnhoven I.M., Bjelica S., Santibáñez J.F. “Mesenchymal Stem Cells and Calcium Phosphate Bioceramics: Implications in Periodontal Bone Regeneration”. Chapter from book: *Advances in Experimental Medicine and Biology*. Springer, New York, NY. **2018**.
- [2] Vivanco J.F., Aiyangar A., Slane J., “Multiscale Biomechanical Characterization of Bioceramic Bone Scaffolds. Chapter from Book: *Experimental Methods in Orthopaedic Biomechanics*. **2017**.
- [3] Leiva V., Vivanco J.F., “Fatigue Models”. *Wiley StatsRef: Statistics Reference Online*. **2015**.

INVITED SEMINARS

- “Mecánica de Materiales en Bioingeniería” (Spanish), XXII Congreso Nacional de Estudiantes de Ingeniería Civil, Valparaíso, Chile, November 2021.
- “Aplicaciones de la Mecánica de Materiales en Ingeniería de Tejidos Óseos (Spanish), Seminario Virtual de Doctorado de Ingeniería Mecánica, Dept. de Ingeniería Mecánica, Universidad Técnica Federico Santa María, Chile. June 2021.
- “Valparaíso Tecnológico: Desde la impresión 3D hasta la (Bio)-Ingeniería”, (Spanish), Museo de Historia Natural de Valparaíso, Chile. November 2018.
- “Análisis Biomecánico de Exoesqueletos Calcáreos: el caso de *Argopecten Purpuratus*”, (Spanish), XXXVIII Congreso de Ciencias del Mar, Valdivia, Chile. May 2018.
- “Comportamiento Biomecánico de Materiales en Traumatología”, (Spanish), Dept. de Ingeniería Mecánica, Universidad de Santiago, Chile. November 2017.
- “Comportamiento Mecánico de Biomateriales Utilizados en Medicina Ortopédica” (Spanish), Dept. de Física, Pontificia Universidad Católica, Chile. March 2017.
- “Aplicaciones en Biomecánica Ortopédica”, (Spanish), Dept. de Ortopedia y Traumatología, Pontificia Universidad Católica, Chile. October 2014.
- “Comportamiento Mecánico de Biomateriales en Implantes”, (Spanish), Centro de Biotecnología, Universidad Federico Santa María, Chile. October 2014.
- “Mechanical Behavior of Orthopedic Biomaterials”, First International Workshop on Statistical Models for Engineering of Advanced Materials, Universidad Adolfo Ibáñez, Chile. October 2014.
- “Mechanical Behavior of Biomaterials: Applications in Bone Biomechanics”, Bioengineering Seminar, Dept. of Aerospace and Mechanical Engineering, University of Notre Dame. October 2013.
- “Bone Bioreactor and Loading System”, Wisconsin Alumni Research Foundation, UW-Madison. August 2011.
- “Bioceramic Bone Scaffolds”, Graduate Seminar Lecture, Dept. of Civil Engineering and Mechanics, UW-Milwaukee. April 2011.

PROFESSIONAL SERVICE

Academic Leadership

- Organizer: “B3MAT OpenLab Workshop in Bioengineering”; hands-on experience around biomaterials, biochemistry and cell biology. Universidad Adolfo Ibáñez, Chile. October 2021.
- Organizer: Webinar: “Descubriendo la Bioingeniería: Aplicaciones en Regeneración de Tejidos Biológicos”. Universidad Adolfo Ibáñez, Chile. October 2020.
- Organizer: Winter School for high school teachers and students “Descubriendo la Bioingeniería”. Universidad Adolfo Ibáñez, Chile. July 2019.
- Organizer: Workshop: “Biomaterials Day Workshop”, Universidad Adolfo Ibáñez, Chile. November 2015.

- Faculty advisor of the student association: “Engineering Global Health-UAI”. Universidad Adolfo Ibáñez, Chile. 2015.
- Organizer: Workshop: “Design of Medical Devices and Manufacturing”, Universidad Adolfo Ibáñez, Chile. May 2015.
- Organizer of first international workshop on statistical models for engineering of advanced materials, Universidad Adolfo Ibáñez, Chile. October 2014.
- Organizer: “How do we recognize when a multidisciplinary approach is necessary? An interface colloquium on technology, science, and society”, Madison, WI, <https://sites.google.com/site/interfacecolloquiumuwmadison/>
- Student Mentoring: Trained undergraduate and beginning graduate students with laboratory research practices, structural analysis and offered advice for on-going research projects, University of Wisconsin-Madison, WI, 8/2006- 11/ 2011.
- Served as student professional development and as coordinator for part-time faculties at Department of Civil Engineering, Universidad Técnica Federico Santa María, Chile, 12/2002 – 1/2004.
- Served as college representative to the Chilean Chamber Construction, Chile 1/2001-1/2004.

Manuscript Reviewer

- | | |
|---------------------------|--|
| – Orthopedic Biomechanics | – ACS Biomaterials Science & Engineering |
| – Acta Biomaterialia | – Marine Biology |
| – Plos ONE | – Materials Science and Engineering C: Materials for biological Applications |
| – Journal of Biomechanics | – Journal Mechanical Behavior of Biomedical Materials |

Grant Reviewer

- CONICYT, Chilean National Science Foundation
- Intramural grants of different Chilean universities and Chilean Government (FONDEF, FONIS, CORFO)

PROFESSIONAL MEMBERSHIPS

- | | |
|--|---|
| – American Society of Mechanical Engineering | – American Society of Bone Mineral Research |
| – American Society of Biomechanics | – Canadian Society for Biomechanics |
| – The American Ceramic Society | |

MENTORING EXPERIENCE

Post-Doctoral Trainees (director/sponsor)

- [1] 07/2021-present Carolina Angulo, Ph.D.
Project: “3D Printing of Bioactive Scaffolds with Controlled Geometry for Bone Tissue Engineering”
- [2] 03/2018-12/2019 Raúl Vallejos, Ph.D.
Project: “Interacción Celular y Biomecánica de Estructuras Porosas Tridimensionales Utilizadas Para Regeneración Ósea”
- [3] 10/2015-10/2016 Isabel Benjumedá, Ph.D.
Project: “In Vitro Analysis of the Proliferation and Osteogenic Differentiation of hGMSCs in a CaP Bioceramic”

Master’s Students (director)

- [1] 01/2022-present M. Fernanda Álamos, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Design and Analysis of Animal Implants”.
-Research stay: EMPA-Switzerland (2022)
- [2] 01/2022-present Alejandra Correa, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Design and analysis of Bioreactors for Bone Scaffold Applications”.
-Research stay: Queen’s University, Canada (2022)
- [3] 03/2021-present Pablo Núñez, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Efectos Mecánicos y Biológicos de Micropartículas Bioactivas en Matrices Poliméricas de Estructuras Biocompatibles”.
-Research stay: EMPA-Switzerland (2020)
- [4] 03/2021-present Sebastián Llano, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Análisis y Modelación de Estructuras Porosas en Gradiente Utilizadas en Ingeniería de Tejidos”.
- [5] 03/2021-present Aline Bär, M.S. Civil Engineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Análisis Mecánico Mediante de Elementos Finitos de Andamios Porosos Biocompatibles”.
- [6] 03/2020-present Miguel Pardo, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Análisis Mediante DIC de Estructuras Porosas Biocompatibles”.
-Research stay: EMPA-Switzerland (2021)
- [7] 03/2020-present Ignacia Muñoz, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Desempeño Biológico de Materiales Carbonatados de Origen Natural” (co-director, directora: Carola Millán).
-Research stay: Queen’s University, Canada (2022)
- [8] 03/2020-present Fabiola Vásquez, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Caracterización de Imágenes Obtenidas con Microscopía Confocal de Adhesión y Proliferación de Células Mesenquimales Obtenidas de Tejido Gingival en un Biocerámico CaP en Forma de Toroide”.
- [9] 03/2020-present José Contreras, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Diseño y Evaluaciones Mecánicas y Biológicas de Andamios Poliméricos Reforzados con Partículas Bioactivas”.
-Research stay: EMPA-Switzerland (2019; 2021)
- [10] 03/2020-present Carlos Toro, M.S. Industrial Engineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Análisis Factorial de Parámetros de Fabricación de Manufactura 3D-FDM en Propiedades Mecánicas de Polímeros”.
- [11] 06/2017-11/2018 Tomás Vukasovic, M.S. Mechanical Engineering, PUC - CHILE.
Thesis: “Análisis Experimental y Computacional de la Propiedades Mecánicas de Polímeros Utilizados en Impresión 3D” (co-director, director: Diego Cellentano).
- [12] 03/2017-09/2020 Victor Iribarra, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Interacción de Biovidrios con Células Madres” (director, co-directora: Carola Millán).
- [13] 03/2017-01/2019 Zhuo Chen, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Desempeño Biomecánico de Biovidrios para el uso en Ingeniería de Tejidos Biológicos”.

Professional Degree in Engineering, Undergraduate Students (director)

- [1] 03/2021 Carlos Prieto López, Mechanical Engineering, UTFSM.
Thesis: “Estudio Numérico/Experimental de las Propiedades Mecánicas de Modelos Porosos Fabricados con Impresoras 3D del tipo FDM de Alta Resolución a Partir de Imágenes de Microtomografía Computacional de Tejidos Óseos” (co-director, director: Luis Pérez P.)
- [2] 04/2020 Matías Fuentes, Civil Engineering, UNIVERSIDAD DEL BÍO-BÍO.
Thesis: “Microencapsulación de Agentes Rejuvenecedores para la Auto-Reparación de Materiales Asfálticos” (co-director, director: José Norambuena)
- [3] 04/2020 Felipe Muñoz, Civil Engineering, UNIVERSIDAD DEL BÍO-BÍO.
Thesis: “Síntesis y Caracterización de Microcápsulas Biopoliméricas para la Auto-Reparación de Materiales Asfálticos” (co-director, director: José Norambuena)
- [4] 07/2020 Juan Pablo Carrasco, Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Desarrollo de una Plataforma de Códigos de Color para Personas con Discapacidad Visual para una posterior aplicación en Conchas de Moluscos Chilenos” (co-director, director: Carola Millán).
- [5] 11/2019 Rafaela Urrutia, Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Investigación Sobre Cómo la Variación de las Propiedades Geométricas en Términos de Porosidad y Tamaño de Poro Afectan el Desempeño Biomecánico de Estructuras Porosas”.
- [6] 11/2019 Carlos Toro, Industrial Engineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Estudio de la Calidad de Manufacturación de Muestras Fabricadas Mediante Impresión 3D Sometidas a Ensayos Mecánicos”.
- [7] 11/2019 Juan Pablo Hasche, Mechanical Engineering, UTFSM.
Thesis: “Estudio Numérico de la Influencia del Porcentaje de Relleno Sobre las Propiedades Mecánicas de Piezas de Ti-6al-4v Fabricadas Mediante Manufactura Aditiva Usando la Tecnología de Sinterización Directa por Láser de Metal. Aplicación en Implante Mandibular” (co-director, director: Luis Pérez P.).
- [8] 11/2018 Luis Carreño, Mechanical Engineering, UTFSM.
Thesis: “Caracterización Numérica de las Propiedades Mecánicas de las Muestras de Tejido Óseo Impresas por Manufactura Aditiva a Partir de Imágenes de μ -CT” (co-director, director: Luis Pérez).
- [9] 01/2017 Nicolás Aránguiz, Valentina Arenas, Ricardo Cavada, Felipe Rodrigo, Industrial Engineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Project: “Sistema de Inteligencia Wearable para sanatorio Marítimo de Viña del Mar”.
- [10] 01/2017 Thomas Vielma, Civil Engineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Efecto de la Microarquitectura en la Respuesta Mecánica de Estructuras Porosas: Un Análisis Estructural Utilizando Modelos de Prototipo Rápido”.
- [11] 04/2013 Giorgio Blanco, Industrial Engineering, UTFSM.
Thesis: “Diagnóstico de los Bancos de Sangre en Chile para la Incorporación de Identificación por Radio Frecuencia en su Cadena de Suministros” (co-director).
- [12] 12/2012 Ricardo Daniel Astudillo, Industrial Engineering, UTFSM.
Thesis: “Evaluación de Tecnología RFID como Ventaja Competitiva en el Sector de Diagnóstico Clínico” (co-director).
- [13] 12/2011 Benjamín Valencia, Industrial Engineering, UTFSM.
Thesis: “Identificación De Oportunidades Para Investigación en Bioingeniería, Osteoporosis y Fractura en Chile” (co-director).
- [14] 10/2003 Juan Saavedra, Civil Engineering, UTFSM.
Thesis: “Análisis Mecanicista De Pavimentos De Hormigón De Tipo Portuario”.
- [15] 10/2003 Claudia Casanova, Construction Engineering, UTFSM.
Thesis: “Diseño con Cono de Penetración en vías Secundarias”.

Doctoral Students (committee member)

- [1] 04/2020- Present Mauricio Campillo Canto, Ph.D. Mechanical Engineering, UTFSM.
Thesis: “Estudio Numérico del Comportamiento Mecánico de Espumas Metálicas de una Aleación ($\beta+\gamma$)-TiNbTa con Porosidad Funcionalmente Dirigida para Aplicaciones Biomédicas”.
- [2] 04/2020- Present Carlos Loyo, Ph.D. Materials Science, UNIVERSIDAD DE SANTIAGO.
Thesis: “Biomateriales Nanocompuestos de Policaprolactona y Óxido de Grafeno Recubiertos con Colágeno para Aplicaciones de Regeneración de Tejido Óseo”.
- [3] 08/2020- present Daniela Acuña, Ph.D. in Materials Science, UNIVERSIDAD DE CHILE.
Thesis: “Fabricación y Caracterización de Membranas Reabsorbibles Híbridas de Biovidrio, Gelatina y Nanocristales de Celulosa Bacteriana, para Regeneración Ósea Guiada Mediante Electrospinning”.
- [4] 03/2018- present Matías Pacheco, PhD in Mechanical Engineering, UNIVERSIDAD DE SANTIAGO.
Thesis: “Caracterización del Comportamiento Elastoplástico de Chapas de Cobre”.
- [5] 10/2021 Francisco Alister, Ph.D. in Mechanical Engineering, PUC – CHILE.
Thesis: “Plastic Anisotropy and Formability Estimation in Zinc Sheets”.
- [6] 08/2020 Daniel Canales, Ph.D. in Materials Science, UNIVERSIDAD DE SANTIAGO.
Thesis: “Preparación y Caracterización de Biomateriales Basados En Poli (Ácido Láctico) “PLA” con la Incorporación de Nanopartículas para Aplicaciones en Biomedicina”.
- [7] 05/2014 Josh Slane, Ph.D. in Materials Science, UNIVERSITY OF WISCONSIN-Madison, USA.
Thesis: “The Use of Micro and Nano Particulate Fillers to Modify the Mechanical and Material Properties of Acrylic Bone Cement”.

Master’s Students (committee member)

- [1] 04/2019 Luiggi Pessoa, M.S. Mechanical Engineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Experimental Investigation of the Influence of Bulk Properties on the Ignition of Surrogate Porous fuel beds”.
- [2] 11/2017 Camilo Cisternas, M.S. Mechanical Engineering, UNIVERSIDAD DE SANTIAGO.
Thesis: “Análisis Experimental, Analítico y Numérico del Comportamiento de un Mecanismo Biomimético Plano Bajo Desplazamientos Cíclicos”.
- [3] 09/2017 Diego González, M.S. Mechanical Engineering, UNIVERSIDAD DE SANTIAGO.
Thesis: “Análisis Experimental y Numérico del Comportamiento Bajo Desplazamientos Cíclicos de un Mecanismo Biomimético Plano”.
- [4] 04/2017 Matías Pacheco, M.S. Mechanical Engineering, UNIVERSIDAD DE SANTIAGO.
Thesis: “Caracterización del Comportamiento Elastoplástico de Chapas de Cobre”.
- [5] 05/2016 Gastón González, M.S. Bioengineering, UNIVERSIDAD ADOLFO IBÁÑEZ.
Thesis: “Producción Controlada de Celulosa en la Cepa Sinorhizobium meliloti 1021”.
- [6] 05/2014 Jeongki Lee, M.S. Civil Engineering, UNIVERSITY OF WISCONSIN-Madison, USA.
Thesis: “Evaluation Of Diatomaceous Earth Content For Potential Engineering Applications In Natural Soils”.