Federal University of Santa Catarina

http://dpgi.proplan.ufsc.br/ufsc-em-numeros/

46,225 Students
2170 Faculty staff
3174 Technical and administrative staff
116 Undergraduate courses
61 Master programs
55 Doctoral programs

Federal University of Santa Catarina
Prof. Luiz Carlos Cancellier de Olivo - Dean of the University

Technological Center
Prof. Edson Roberto De Pieri - Director

Mechanical Engineering Department
Prof. Edson Bazzo - Department Head
Department of Mechanical Engineering

Created in 1971
67 Full time faculty
25 Laboratories or research groups
About 15,000 m² building area

2 Undergraduate courses
2 Master programs and
2 Doctoral programs
1600 Students
Mechanical Engineering (1962)
The undergraduate program in Mechanical Engineering has a duration of 5 years
55 students/semester (4,032 hours)
Approximately 3100 graduates by 2017
http://emc.ufsc.br/gradmecanica/

Materials Engineering (1999)
The undergraduate program in Materials Engineering has a duration of 5 years
35 students/semester (4,344 hours)
Approximately 600 graduates by 2017
http://emc.ufsc.br/gradmateriais/

At least 60% of students do research work in laboratories, they take part in competition teams and other extracurricular activities.

100% of undergraduate students do internship in the industry.
Master and Doctoral Degree Program in Mechanical Engineering

Master Degree level (1969)
Alumni: 1,530 by 2016

Doctoral Degree level (1981)
Alumni: 390 by 2016

http://ppgmec.posgrad.ufsc.br/
Master and Doctoral Degree Program in Materials Science and Engineering

Master Degree level (1994)
Alumni: 300 by 2016

Doctoral Degree level (1994)
Alumni: 140 by 2016

http://www.pgmat.ufsc.br/portal/

Microstructural Characterization

Ceramic and Polymeric Materials

Biomechanics

Powder metallurgy, plasma processing and Nanotechnology

Additive Manufacturing
Research Areas and Integration

EMC

Head of Department

Administration Council

Research Council

Faculty and Staff

Research Groups

Academic Programs

Researchers

Students

Multidisciplinary Labs

Cooperation Networks

Thematic Areas (3)

Research Areas

What EMC does

How EMC is structured
People:
Faculty staff: 5
Research fellow: 1
Scientific collaborators: 5
Master and Doctoral students: 24
Undergraduate student: 10

Focus:
Cutting-edge research solutions for engines and robots for special applications development especially in the areas of Mechanical Design and Synthesis and Analysis of Mechanisms

Research areas:
• Mechanical design of mechanisms and machines
• Robotic surgery
• Process control and trajectory generation
• Specialized applications simulators
• Cable-driven for load/person transportation
• Robotized inspection in submerged environment
• Vehicle suspension mechanism design

Partnership:
King’s College London, Norwegian University of Science and Technology (NTNU), Genova University, Tianjin University China, London South Bank University and others.

Contractors:
Petrobras, BMW, Furnas, Copel, Cemar, Petrosix, WEG, Ministério das Cidades and others.

Contact:
Prof. Daniel Martins
daniel.martins@ufsc.br
www.robotica.ufsc.br
Faculty staff: 5  
Research fellow: 2  
Scientific collaborators: 2 (KTH)  
Master and Doctoral students: 35  
Undergraduate student: 21

**Research areas:**
- Numerical methods for aircraft interior noise simulation (FEM, BEM and SEA)
- Silent Aircraft Project - Design and construction of test facilities for liner impedance eduction and jet noise studies
- Application of beamforming techniques for source localization
- Noise control of air-conditioning and hydraulic systems
- Application of viscoelastic and poroelastic materials for noise and vibration control

**Focus:**
Research on topics related to acoustics and vibration with focus on: noise and vibration control on aircrafts, aeroacoustics and numerical methods.

**Partnership:**
MWL - Marcus Wallenberg Laboratory for Sound and Vibration Research – KTH, Stockholm

**Contractors:** Embraer, Petrobras, Embraco and others.

**Contacts:**
Prof. Arcanjo Lenzi  
arcanjo.lenzi@ufsc.br  
Prof. Júlio A. Cordioli  
julio.cordioli@ufsc.br  
Prof. Andrey R. da Silva  
andrey.rs@ufsc.br

www.lva.ufsc.br
Precision Engineering Laboratory

Focus:
Research on topics related to machining with geometrically defined and not defined cutting edges, Precision Engineering and materials processing with LASER (Welding, Cladding, Heat treatment)

Research areas:
- Machining Processes - Turning and grinding
- Machining of Hardened Materials
- Machining of Self Lubricated Materials
- Modeling and Simulation of Machining Processes
- Materials Processing with LASER
- Mechatronic Systems Design and Construction
- Precision and Ultraprecision Machine Development
- Precision Manufacturing
- Biomaterials Fatigue Studies
- Silicon cutting with diamonds wire

Faculty staff: 4
Staff: 1
Scientific collaborators: 1
Master and Doctoral students: 20
Undergraduate student: 20

Partnership:
RWTH Aachen University, ETH Zürich, Welle LASER, TU Berlin, TH Ilmenau, Fraunhofer ILT, Fraunhofer IPT, Hochschule Offenburg and others

Contractors: Petrobras, Embraco HERGEN, and others.

Contact:
Prof. Walter L. Weingaertner
w.l.weingaertner@ufsc.br
Prof. Rolf B. Schroeter
rolf.schroeter@ufsc.br
Prof. Milton Pereira
milton.pereira@ufsc.br
Prof. Fábio Antônio Xavier
f.xavier@ufsc.br
CERAMIC & COMPOSITE MATERIALS
RESEARCH LABORATORIES

Focus:

- Materials Synthesis & Processing
- Mechanical Behaviour: Simulation & Measurement

RESEARCH AREAS:

- Numerical methods for functionally graded materials/FGM (FEM)
- Biomaterials
- Composites Additive Manufacturing
- Mechanical Behavior of Solids
- Materials Applied Colorimetry
- Nanomaterials: Synthesis and Processing
- Creep Resistant Materials

Academic Staff: 5
Technical Staff: 1
Scientific Associates: 5
Master and Doctoral Students: 23
Undergraduate Students: 25

Contact:
Prof. Dr.-Ing. M.C. Fredel
m.fredel@ufsc.br
www.cermat.ufsc.br
Facility staff: 4
Staff: 3
Scientific collaborators: 12
Master and Doctoral students: 35
Undergraduate student: 37

Focus:
- Instrumentation and Measurement Systems Development and Application,
- Systems for Inspection and Industrial Testing

Research areas:
- Hermetic Compressor Testing
- Inspection of Composite Materials
- Residual Stress Measurement
- Pipeline Testing and Inspection
- Artificial Intelligence Applied to Industrial Testing
- Underwater Measurement and Inspection
- Optical Fiber Sensors
- Laser and Other Optical Methods.

Partnership:
Rwth Aachen University, Stuttgart University, Basilicata University, UFRS, UFU, Photonita, EngeMovi

Contractors:
Petrobras, Embraco, CELESC.
Laboratory of Energy Conversion Engineering and Energy Technology (www.lepten.ufsc.br)

**Members:**
Primary Faculty:
- Prof. Alexandre K. da Silva
- Prof. Júlio Passos
- Prof.ª Marcia Mantelli
- Prof. Sergio Colle

Collaborating Faculty: 5
Research fellow: 10
Graduate students: 36
Undergraduate student: 33
Technical staff: 6

**Collaborating Institutions:**
- TUE (The Nederlands)
- Clemson University (USA)
- IKE (Germany)
- INETI (Portugal)
- NASA (USA)
- PUC (Chile)
- Diego Portales University (Chile)
- Laval University (Canada)
- UT-Austin (USA)
- Bermago University (Italy)

**Funding Agencies:**
- FINEP, Petrobras, AEB, Embraer, Tractebel, INPE/CPTEC, CHESF, CEMIG, COPEL, CTEEP, CNPq, CAPES, VOLVO, and others.

**Infrastructure:**
- Over 3.000 m² of dedicated space
- Numerous commercial packages
- BSRN / WMO surface station
- Dedicated machine shop
- HT vacuum oven
- IR, high-speed cameras
- Leak detection system
- Solar radiometers calibration facilities

**General Research Focus:**
Fundamental and applied thermal-fluids related research.

**Specific research areas:**
- Solar radiation mapping
- Solar heating/cooling
- Concentrated solar power
- Thermosyphon technology
- Heat pipe technology
- Thermo-physics
- Micro heat transfer
- Phase change processes
- Heat Exchangers
- Supercritical fluids
- Bioinspired systems
Facility: 5
Staff: 2
Post-docs and researchers: 5
Master and Doctoral students: 25
Undergraduate student: 12

Cooperation: PUC-Rio, UNICAMP, UFRGS, IST-Lisbon (Portugal), C3-NUI Galway (Ireland), IVG-Uni Duisburg-Essen (Germany), IFF-KIT (Germany), UFSM (Chile)

Support: CAPES, CNPq, Petrobrás, FCA, BMW and others.

Focus: Theory, techniques, devices, and equipments for energy conversion with emphasis on (1) combustion, thermochemical and electrochemical conversion, (2) generation and co-generation, (3) biofuels, (4) heat transfer and energy efficiency.

Research areas:
- Chemical kinetics of combustion
- Hydrogen and fuel cells
- Steam generation
- Conversion and rational use of energy
- Industrial ovens and kilns
- Transport and reaction in porous media (porous burners and catalysis)
- Loop heat pipes and capillary pumped loops

Contact: http://www.lab cet.ufsc.br/amir.oliveira@ufsc.br
+55-48-3721-9390

Primary Faculty:
Prof. Amir A. M. Oliveira
Prof. Edson Bazzo
Prof. Vicente P. Nicolau
Laboratory of Hydraulic and Pneumatic Systems

People:
Faculty staff: 3
Scientific collaborators: 5
Master and Doctoral students: 11
Undergraduate student: 9
12 Doctoral theses concluded
45 Master’s theses concluded

Focus:
Hydraulics and pneumatics in the automation and control scenario

Research areas:
1. Analysis and design of hydraulic and pneumatic systems and components.
2. Methods for development of mechatronic systems with H&P.
3. Computational systems to support the design of hydraulic systems and components.

Contact:
Prof. Victor J. De Negri
victor.de.negri@ufsc.br
www.laship.ufsc.br
Research Laboratories for Emerging Technologies in Cooling and Thermophysics

Faculty staff: 5
Research fellow: 5
Master and Doctoral students: 41
Undergraduate students: 44

Focus:
Compressors & Cooling Systems

Research areas:
- Expansion devices
- Household compressors
- Frost formation
- Heat exchangers
- Electric motor cooling
- Magnetic cooling
- Refrigeration controls
- Commercial compressors
- Compact systems
- CO₂ systems
- Axial and radial fans
- Thermal management of compressors
- Thermodynamics of compressors
- Thermodynamics of mixtures
- Multiphase flows
- Thermophysical properties

Partnership:
Embraco, Whirlpool, Petrobrás, Embraer, Panasonic, Danfoss, Bundy, Komeco, Electrolux, Esmaltec, Metalfrio, Fanem, BSH, Marcegaglia and others.

Contact:
melo@polo.ufsc.br
www.polo.ufsc.br

Primary Faculty:
Prof. Claudio Melo
Prof. Alvaro T. Prata
Prof. César J. Deschamps
Prof. Jader R. Barbosa
Prof. Christian J. L. Hermes
Contact: maliska@sinmec.ufsc.br  
www.sinmec.ufsc.br

Focus: Development of numerical tools for the solution (via simulation) of engineering problems involving fluid dynamics and heat transfer for the Navier-Stokes and Darcy’s equation.

Research areas: Petroleum reservoirs simulation…

Multiphase flows…

Geomechanics…

Aerodynamics…

Development of tools for CFD applications…

Among others.

Team:
✓ Faculty members: 3
✓ External scientific collaborators: 3
✓ Researchers (under contract): 5
✓ Master and Doctoral students: 8

Partnership:
✓ Petrobras;
✓ University of Texas at Austin;
✓ University of Padova;
✓ PRH-ANP/MCTI & PFRH;
✓ ESSS - Engineering Simulation And Scientific Software.

Primary Faculty: 
Prof. Clovis R. Maliska
Prof. A. Fabio C. Silva
Porous Media and Thermophysical Properties Laboratory

X Ray Nano and Micro-Tomography

Lattice Boltzmann simulation of fluid dynamics

Surface Physics

Research on porous media properties
Numerical Simulations

Development of Thermal Transducers
Research on Thermal Comfort
Energy Efficiency of Buildings

Contact:
Prof. Celso Peres Fernandes - Prof. J.A.Bellini da Cunha Neto - Prof. Paulo Cesar Philippi - Prof. Saulo Güths

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saulo@lmpt.ufsc.br

www.lmpt.ufsc.br

Contractors:
CENPES
PETROBRAS
ELETROBRAS
CAPES
CNPq

Scientific Collaboration:
University of Edinburgh-UK
Heriot-Watt University-UK
Teesside University-UK
Université de Lille-FR
Université d’Aix-Marseille-FR
IMFT de Toulouse-FR
University of Aucklalā-FI
LBL, Berkeley/CA-USA
ITMO University/St. Petersburg-RUS
University of Cape Town-South Africa
GFNA/UEL-BR
LAMIR/UFPR-BR
Instituto de Geociências/UNICAMP-BR
INT/BJ-BR
Laboratório de Petrofisica/UFCG-BR
Laboratório de Sistemas Térmicos/PUC PR-BR
Laboratório de Mecânica dos Fluidos/UFRJ-BR
Depto. de Engenharia de Petróleo/UDESC-BR
Faculty staff: 3
Research fellow: 2
Scientific collaborators: 1
Undergraduate student: 4

Focus:
Didactic laboratory - graduate and undergraduate teaching and equipment development. Performance test and measurements.

Research areas:
- Development of didactic equipment;
- Radiative properties measurement;
- Nondestructive test methods using thermography.

Contact:
Prof. Vicente de Paulo Nicolau
vicente.nicolau@ufsc.br
www.labtermo.ufsc.br

Partnership:
Université Laval – Québec
Cethil - INSA de Lyon - France

Contractors: SCGás, Casan,
Metalúrgica Souza, Cerâmica Guarani,
Metalúrgica Krueger, CCS Plásticos,
ITC exaustores, Plasson, WEG, Whirlpool.
Materials Laboratory

Research on topics related to development of materials and processes for special applications

Institutional
Embraco, BNDES, Capes, CNPq, Finep

Universities
UFRN, UFU, UFPR, Bremen, Bayreuth, Hamburg University of Technology

FOCUS
Powder Metallurgy
Nanomaterials
Corrosion
Tribology
Plasma
Polymers
Management

PARTNERS
Faculty staff: 7
Research fellow: 3
Master and Doctoral students: 24
Undergraduate student: 35

PEOPLE

RESEARCH AREAS

www.labmat.ufsc.br

Prof. Aloisio Nelmo Klein
a.n.klein@ufsc.br
Faculty staff: 3
Staff: 1
Scientific collaborators: 3
Master and Doctoral students: 15
Undergraduate student: 18

Focus:
Welding Processes and Automation, Procedures, Equipment and Instrumentation

Research areas:
• Welding Processes (Arc, LASER, Hybrid)
• Cladding via Welding Processes
• Orbital Welding
• Power sources and Instrumentation design
• (hardware and software)
• Robotics and Automation (sensors, mechatronics)
• Special Torches and Auxiliary Devices.

Partnership:
Rwth Aachen University, FMC Technologies, Durum Verschleißschutz GmbH, SPS, IMC Soldagem, COPPE/POLI/CT/UFRJ

Contractors: Petrobras, Tractebel Energia, Embraco, WEG.

Primary Faculty:
Prof. Regis Silva
Prof. Mateus B. Schwedersky

Contact:
regis.silva@ufsc.br
www.labsolda.ufsc.br
Microstructural Characterization Laboratory

Faculty staff: 2
Scientific collaborators: 3
Master and Doctoral students: 2
Undergraduate student: 4

Focus:
Microstructure and structure characterization of materials.

Characterization techniques:
• X-ray diffraction
• Optical microscopy/Metallography
• Scanning Electron Microscopy

Contact:
Profª. Ana Maria Maliska
a.maliska@ufsc.br

Partnership:
UFPR/UFTPR /IFSC
Staff:
Faculty staff: 2
Scientific collaborators: 4
Master and Doctoral students: 10
Undergraduate student: 8

Partnership:
Additive Manufacturing Network - Br IFSC, SENAI
UMinho-Portugal and others.

Contractors: FIAT, Embraer, Alkimat, Nanoendoluminal, Mormaii and others.

Focus:
Research on topics related to additive manufacturing and molding of plastics focusing on understanding the relations between process parameters, microstructure and properties.

Research areas:
• Additive Manufacturing (SLS/SLM, SLA, FDM and others)
  • Materials (polymers, metals)
  • Building parameters
  • Fields of application
• Molding of plastics
  • CAE/CAD/CAM
  • Injection molding
  • Extrusion molding
  • Thermoforming

Contacts:
Prof. Carlos H. Ahrens / Prof. Gean V. Salmoria
carlos.ahrens@ufsc.br     gean.salmoria@ufsc.br

www.nimma.ufsc.br
Laboratory of Glass-Ceramic Materials

Faculty staff: 2
Research fellow: 2
Scientific collaborators: 8
Master and Doctoral students: 11
Undergraduate students: 6

Partnership:
• University of Modena and Reggio Emilia (Modena/Italy)
• Institute of Ceramic and Glass (Madrid/Spain)
• UNESC, UNIVILLE, UNAERP, UNIFESP (Brazil)

Research contractors: CAPES, CNPq, FAPESC.

Focus:
Research on topics related to ceramic and vitreous materials: glass and glass-ceramics, porous ceramics, glazes, traditional ceramics, colloidal processing, recycling of industrial solid wastes.

Research areas:
• Sintered glass-ceramics with different CTE for different applications (e.g. fuel cells, selling, biomaterials)
• Materials with controlled porosity for thermal insulation systems
• Materials for catalyst supports
• Materials for radiant porous burners
• Recycling of industrial waste (glass ceramics) and synthesis of nanomaterials
• Glazes for especial applications

Contact:
Prof. Antonio Pedro N. Oliveira
antonio.pedro@ufsc.br
www.vitrocer.ufsc.br
People:
Faculty staff: 1
Master’s theses concluded: 28
Doctoral theses concluded: 6
Master students: 7
Doctoral students: 5
Undergraduate students: 3

Partnership:
Marinha do Brasil
Tractebel Energia

Focus:
Study the properties and performance of metallic materials, with emphasis on mechanical forming and heat treatment. Establish correlations between processing, microstructure and behaviour of materials.

Research areas:
• Transformation Metallurgy: mechanical forming; heat, mechanical and chemical treatment
• Physical Metallurgy: phase transformations and mechanical properties of metals and alloys
• Wear assessment of metal forming tools and performance improvements
• Effect of chemical composition on Austenitization and recrystallization of dual-phase steels
• Maraging 350: Microstructure, phase transformations and forming
• Effect of chemical composition and Austempering temperature on microstructural characteristics of Carbide-free bainitic steels

Contacts:
Prof. Carlos A. S. Oliveira
carlos.a@ufsc.br
www.labconf.ufsc.br
**Human resources**
- Faculty staff: 5
- Scientific collaborators: 2
- Master and doctoral students: 14
- Undergraduate students: 7

**Expertise Area**
- Modeling, Testing and Numerical Simulation in Mechanics of Solids and Structures

**Research subjects**
- Constitutive Modeling and Testing of Polymers and Soft Tissues
- Fatigue testing and modeling
- Extended Finite Elements
- Topology Design Optimization
- Vehicle Dynamics
- Biomechanics and medical implants (LEBm)

**Collaboration Network**
- École Centrale de Nantes – Fr
- Swansea University – Uk
- Laboratório Nacional de Computação Científica – LNCC/MCT - Br.

**Contact:** Prof. Eduardo A. Fancello
eduardo.fancello@ufc.br
Biomechanical Engineering Laboratory

Faculty staff: 5
Staff: 5
Scientific collaborators: 7
Master and Doctoral students: 13
Undergraduate student: 15

Focus:
Research on topics related to design and validation of biomechanical performance of medical devices and biomaterials.

Research areas:
• Design of medical devices
• Modeling and Simulation of Bone-implant systems
• Testing methods development
• Surgical technique evaluation
• Failure analysis of explantes
• Fatigue and Wear of hip, knee and spine prostheses

Contact:
Prof. Carlos R. Roesler
r.roesler@ufsc.br

Prof. Eduardo Fancelllo
eduardo.fancelllo@ufsc.br

Partnership:
ANVISA - National Health Surveillance Agency , INT – National Technology Institute, INTO- National Traumatology and Orthopedic Institute

Contractors: MDT Implants, Spine Implants and others.
Integrated Product Development Nucleus

People:
Faculty staff: 4
Associate Professors: 5
Master and Doctoral students: 11
Undergraduate student: 3
32 Doctoral theses concluded
110 Master theses concluded

Cooperation:
LiU (Sweden)
Technische Hochschule Ingolstadt (Germany)
LASHIP/EMC/UFSC

Research areas:
1. Methodology for product innovation
2. Expert systems to support the design
3. Methodology for reliability and maintainability systems
4. Prototype development of products and equipments

Focus:
Product Development

Books:
1983
2008
2011

Contact:
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acires.dias@ufsc.br
www.nedip.ufsc.br