

ITTC application “Vacuum Science, Technology, and Applications: from nanotechnology to space applications”

18 – 22 May 2020 Buenos Aires, Argentina

Motivation

To introduce science, technology, and application of vacuum to a wide spectrum of people, in particular, undergraduate students, lacking or without any knowledge on the subject. Doing so, hopefully, it is expected to call the interest of trainees to many science and technology branches using or built using vacuum technology. And in the future become part of a research group in some of the many Argentine research Institutions.



Organizer: Romualdo Alejandro Ferreyra.

Presenter: María Carmen Asensio (SSD Chair)



Goals of the course

- ❖ The proposed Technical Course will be oriented to under and graduate students, researchers, and technicians who need or have to learn the basis of vacuum for their daily work, a specific application, research, or because they would like to expand their spectrum of knowledge.
- ❖ Along the course, strongly emphasize o the good practices that conduct to a safe handling/operation, and maintenance of vacuum systems will be made. (In red could be delated)
- ❖ It is expected that attendees of the course grasp and/or strengthen the fundamentals of the physical process involved with the vacuum realm e.g. its technology, production, measurement, practical knowledge on the operation of the vacuum system through the experimental lab.
- ❖ Also, because the host institution, Universidad Nacional de San Martin (UNSAM) sits on the technological-scientific parks, participants of the course will be introduced via talks delivered by researcher and engineers and visits to research and Tech labs to a wide diversity of scientific and technological field make use of vacuum.
- ❖ From the interaction between trainees and expositors and instructors it is expected to result in successful networking. Potentially establishing tight links among the technical, technological and scientific communities.
- ❖ Efforts are addressed to achieve the endorsement of the School board of UNSAM to designate the course as eligible for gaining academic credits previous test evaluation at the end of the event which could be beneficial for UNSAM students attending the course. Additional all participants of the course will receive assistance certificate issued by the UNSAM and Argentinean Physical Society. (In red could be delated)

Programme

Part I: Fundamentals on vacuum production (4 h):

Fundamental Notions: Atmospheric pressure, Units Equivalences, Pressure Unit Conversion Table, Atmospheric pressure and its variation with the Height, Barometer, Absolute and Relative Pressure, Manometers, Vacuum gauges, and Manovacuumeters, Vapor pressure, Water Vapor Pressure.

States of the mater: Gaseous State, Vacuum gas characteristics, Middle Free Path, Equation of Ideal Gases, Dalton's Law.

Vacuum: Definition, Applications, Vacuum Ranges, Final pressure in a Vacuum System, Flow and Total flow of gases to be evacuated, Degassing, Most used Materials in vacuum technology, Average Degassing Rate, Pumping Speed, Pump Characteristic Curves, Flows, Flows according to Vacuum Ranges, Flow Conductance, Diagram of a Classic Pumping System, Pressure ranges for: Designation, CLM and Flow.

Part II: Equipment to obtain vacuum (2 h):

Vacuum Pump Operation Ranges, Vacuum pumps: Diaphragm or Membrane (Dry), Rotary (with oils) - Gas ballast, Piston Rotary (Dry), Roots (Dry), Roots (Dry), Diffusion (with oils) – Liquid Nitrogen Cryotrap, Turbomolecular (Dry), Titanium sublimation (Dry), Ionic (Dry), Cryogenic (Dry).

Part III: Vacuum measurement Devices (2 h):

Application Intervals, Bourdon, Capacitive, McLeod, Pirani, Thermocouple, Cold cathode "Penning", Hot cathode "Bayard-Alpert", Molecular Drag.

Part IV: Experimental Lab (8 h):

Pedagogical vacuum system: demonstration of incremental vacuum level, plasma generation.

Leaking detection Techniques

Visit to research labs at Universidad Nacional de San Martin (UNSAM) and Centro Atómico Constituyente (CAC-CNEA): Lab of Applied Crystallography, PLD Lab, Nano and Micro technology Lab, Accelerator TANDAR.

Part V: Applications of vacuum in Science and Technology (12 h):

Selected Real cases of vacuum applications in various research groups in UNSAM and CAC-CNEA.

Industrial vacuum application presented by argentine local vacuum company representatives.

Provisional List of Tutors:

Dr. Mario Debray División de Aplicaciones a Materiales y Medioambiente, CAC- CNEA	Dr. Hernán Pablo Socolovsky UNSAM, CAC-CNEA
Prof. Dr. Alfredo Juan Departamento de Física e IFISUR, UNS CONICET	Dr. Diego Rubi Instituto de Nanociencia y Nanotecnología / CONICET- CNEA
Dr. Nahuel Vega División de Aplicaciones a Materiales y Medioambiente, CAC- CNEA	Dr. Christian Kristukat ECyT- UNSAM
Ing. Gabriel Sanca ECyT - UNSAM	Ing. Fernando Orlando Depto. Acelerador TANDAR, Asistencia Técnica e Ingeniería, GlyA - Tandar – CAC
Dr. Walter Roberto Tuckart Dto Ingeniería UNS – IFISUR CONICET	Ing. Andrés Fernández Salares Depto. Acelerador TANDAR, Asistencia Técnica e Ingeniería, GlyA - Tandar – CAC
Dr. Gastón Corthey INS-UNSAM, Max Planck Institute, CONICET	Dr. Hernán Pablo Socolovsky UNSAM, CAC-CNEA
Dr. Felix Palumbo UTNBA - CONICET	Dr. Cristian Huck Iriart ECyT-UNSAM, CONICET

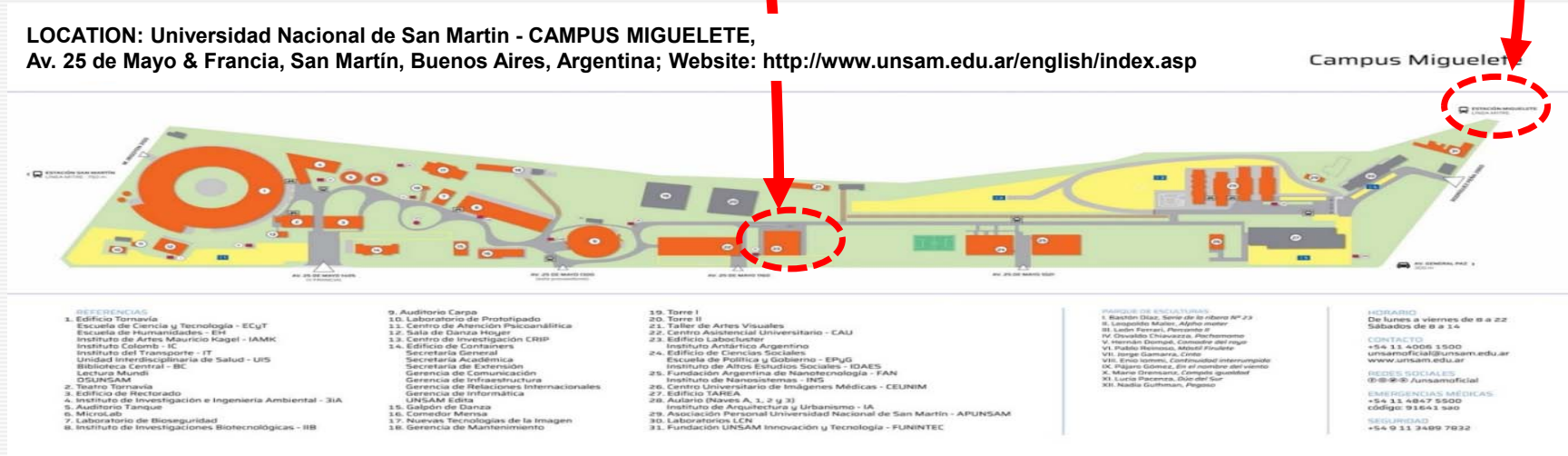
Detailed Program

	Monday May 18	Tuesday May 19	Wednesday May 20	Thursday May 21	Friday May 22
9:00	Registration/Opening	Part I: Fundamentals on vacuum production (Section III) (Dr. Mario Debray)	Coatings to Protect Friction and Wear in Vacuum Applications (Dr. Walter Roberto Tuckart)	ViSiT Lab. Of Nano and Microelectronic – CAC –CNEA (Ing. Juan Bonaparte)	Satellite Solar Cells: reliability testing ViSiT Solar Cell Lab. CAC-CNEA (Dr. Hernán P. Socolovsky)
9:30	Part I: Fundamentals on vacuum production (Section I)			Deposit of thin films using physical vacuum techniques ViSiT PLD Lab CAC-CNEA	
10:00	(Dr. Mario Debray)			(Dr. Diego Rubi)	
10:30	Coffee Break				
11:00	Part I: Fundamentals on vacuum production (Section II) (Dr. Mario Debray)	Part II: Equipment to obtain vacuum (Section I) (Dr. Nahue Vega)	SEM and TEM Imaging Techniques (Dr. Gastón Corthey)	TANDAR Accelerator: Electronic Device Hardness ViSiT TANDAR– CAC -CNEA (Lic. Nahuel Vega) ¥	Metal evaporation for electronic devices Fabrication: E-beam metal evaporation demonstration (Dr. Christian Kristukat)
12:30	Lunch and Networking				
14:00	Simulación de procesos superficiales en UHV usando técnicas ab-initio (Part I) (Prof. Dr. Alfredo Juan)	Part II: Equipment to obtain vacuum (Section II) (Dr. Nahue Vega)	DC and HF Device Characterization at LT and HV (Dr. Felix Palumbo)	Vacuum Laboratory and Detectors (Part I) (Ing. Fernando Orlando/Ing. Andrés Fernández Salares)	Brazilian Synchrotron Light Laboratory (LNLS) ViSiT LAC Lab.-UNSAM (Dr. Cristian Huck Iriart)
15:30	Coffee Break				
16:30	Simulación de procesos superficiales en UHV usando técnicas ab-initio (Part II) (Prof. Dr. Alfredo Juan)	Part III: Vacuum measurement Devices (Ing. Juan Bonaparte)	Thermal/vacuum Testing of Electronic Equipment for Space Applications (Ing. Gabriel Sanca)	Vacuum Laboratory and Detectors (Part II) (Ing. Fernando Orlando/Ing. Andrés Fernández Salares)	Test (Questions)
17:00	Networking		Networking	Networking	Networking

Venue: Building Labocluster - Campus Miguelete - Universidad Nacional San Martín – Buenos Aires Argentina



LOCATION: Universidad Nacional de San Martín - CAMPUS MIGUELETE, Av. 25 de Mayo & Francia, San Martín, Buenos Aires, Argentina; **Website:** <http://www.unsam.edu.ar/english/index.asp>



- REFERENCIAS**
1. Edificio Tornavia
 2. Escuela de Ciencia y Tecnología - ECyT
 3. Instituto de Artes Mauricio Kagel - IAMK
 4. Instituto Colomb - IC
 5. Instituto del Transporte - IT
 6. Unidad Interdisciplinaria de Salud - UIS
 7. Biblioteca Central - BC
 8. Lectura Mundial - OLUNSAM
 9. Edificio de Rectorado
 10. Instituto de Investigación e Ingeniería Ambiental - 3IA
 11. Auditorio Tanquer
 12. Microclub
 13. Laboratorio de Biosseguridad
 14. Instituto de Investigaciones Biotecnológicas - IIB

9. Auditorio Carpa
10. Laboratorio de Prototipado
11. Centro de Atención Psicoanalítica
12. Sala de Danza Hoger
13. Centro de Investigación CBSP
14. Edificio de Containers
15. Secretaría General
16. Secretaría Académica
17. Secretaría de Extensión
18. Gerencia de Infraestructura
19. Gerencia de Relaciones Internacionales
20. Gerencia de Informática
21. UNSAM Edna
22. Galpón de Danza
23. Comedor Mensa
24. Nuevas Tecnologías de la Imagen
25. Gerencia de Mantenimiento

19. Torre I
20. Torre II
21. Taller de Artes Visuales
22. Centro Asistencial Universitario - CAU
23. Edificio Labocluster
24. Edificio de Ciencias Sociales
25. Instituto Antártico Argentino
26. Edificio de Ciencias Sociales
27. Escuela de Política y Gobierno - EPyG
28. Instituto de Altos Estudios Sociales - IDAES
29. Instituto de Nanotecnología - FAN
30. Instituto de Nanosistemas - INS
31. Centro Universitario de Imágenes Médicas - CEUNIM
32. Edificio TAHEA
33. Aulario (Dóves A. 1, 2 y 3)
34. Instituto de Arquitectura y Urbanismo - IA
35. Asociación Personal Universidad Nacional de San Martín - APUNSAM
36. Laboratorios LCN
37. Fundación UNSAM Innovación y Tecnología - FUNINTEC

- PARKING DE ENCULTURAS**
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CONTACTO
+54 11 4056 3 500
unsamoficial@unsam.edu.ar
www.unsam.edu.ar

REDES SOCIALES
@unsamoficial

UBICACIONES SATELITALES
+54 11 4847 5500
código 916A-1 940

SEGURIDAD
+54 9 11 3485 7932