Venice International University

VIU Graduate seminar

Advanced Wireless Technologies for enhancing the Radio Interface from 5G towards 6G

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September 7-11, 2026

Venice International University
Isola di San Servolo, Venice

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Scientific Coordinator
Ibrahim Tekin,
Sabanci University

VIU Global Challenges Initiatives

This seminar will cover the key enabling technologies for next generation wireless systems, considering antennas, communications and hardware perspectives. With the evolution of the mobile communication networks from the fifth generation (5G) to the sixth generation (6G), capabilities including immersive experiences, massive communication and ubiquitous connectivity are stringently required. International Mobile Telecommunications 2030 (IMT-2030) is expected to connect humans, machines and all surroundings, allowing advanced human-machine interfaces and high resolution video systems (e.g. XR displays) for extending the real world. Such applications will be facilitated by innovative use cases, such as non-terrestrial networks, artificial intelligence, and integrated communication and sensing.
From 5G towards 6G, technologies for enhancing the radio interface include, full duplex communication, massive MIMO (multiple input multiple output), Orbital Angular Momentum (OAM), MEMS antennas, Reconfigurable Intelligent Surfaces (RIS) for reaching high data rates within the bandwidths available at mm-wave , sub-Terahertz (THz) and THz frequencies. In particular, the THz band, with a frequency range from 0.1THz to 10THz and wavelength from 3 millimeters to 30 micrometers, can support unprecedented throughput thanks to its multi-hundred gigahertz continuous bandwidth resources, and therefore represents a perfect solution for 6G networks. Interestingly, when communication technology with high spatial density is also capable of full duplex or high-bandwidth operation, it becomes possible to serve communication and sensing use cases at the same time. Combining this with dense deployments, and near-field operation, the use of communication systems for both localization and sensing everywhere becomes viable.
Non-terrestrial networks (NTN) and Space-Air-Ground Integrated Networks (SAGIN) have the potential to achieve ubiquitous coverage in 6G, by integrating terrestrial communication networks, unmanned aerial vehicles (UAV) networks, high altitude platforms (HAPs) and

satellite networks. However, there are still many issues to be addressed for proper network design, in view of the unique latency, coverage, propagation, and data rate constraints of these systems. Moreover, it is still unclear whether the use of the mm-wave and THz technology is feasible for NTN.

Working towards the realization of 6G technologies, implementation of millimeter-wave and sub-terahertz transceivers, circuits and systems for ultra-wideband communications, and phased-array transceivers are critical. Design of LNA, PA, and related circuitry for broadband and massive arrays possess different requirements and design techniques. It is important to consider both communication and sensing constraints for both spectrum use cases.

In this seminar series, the attendees will have the opportunity to learn about all aspects of the above- mentioned enabling technologies towards 6G, from antennas, communications, integrated communication and sensing to radio transceivers hardware. Moreover, these seminars will provide a comprehensive overview of the innovations introduced by the new standard specifications for beyond 5G, and the recent research and standardization trends towards 6G.

This Graduate Seminar will be led by
- Sabanci University, Turkey
- University of Padua, Italy
- KU Leuven, Belgium

Faculty

Ibrahim Tekin, Sabanci University
Ozgur Gurbuz, Sabanci University
Korkut Kaan Tokgoz, Sabanci University
Michele Zorzi, University of Padova
Marco Giordani, University of Padova
Sofie Pollin, KU Leuven
Francesco Luzzini, Università del Piemonte Orientale

Methodology

The Graduate Seminar will involve a combination of lectures and interactive, and workshop-like activities. Open discussions with the participants will be stimulated. Further, students will get a chance to discuss their research and get feedback from at least three professors via one-on-one meetings. The gradaute seminar schedule will be as follows:

Topics

- mm-wave beam steerable antennas
- OAM antennas
- Reconfigurable (Intelligent Surfaces) antennas
- MEMS antennas
- Full Duplex Communication
- Channel modeling for THz band non-terrestrial communications
- Beam control for THz band non-terrestrial communications
- Resource Allocation and Medium Access Control (MAC) for THz band non-terrestrial communications
- Resource allocation for joint communication and sensing.
- Near-field localization and sensing
- Sensing performance as function of topology, bandwidth and frequency
- Aspects of integrating communication and sensing
- Millimeter-Wave & Terahertz Transceivers
- Ultra-broadband high speed wireless communications
- Phased arrays for wireless communications
- Design of millimeter-wave and terahertz circuits
- Active & Passive Devices for millimeter-wave and terahertz circuit design

Learning outcomes for participants

By attending the proposed Graduate Seminars the graduate students will gain an understanding of and learn the state of the art in:

- Antenna characteristics and antenna use in next generation technologies
- Full Duplex communication
- NTN communications
- Integrated communication and sensing
- Near-field communication and sensing
- Synchronization aspects for communication and sensing

- Beyond 5G standardization activities and innovations
- State of art transmitter/receiver architecture for mm-wave and sub THz
- Circuit design techniques for millimeter-wave and sub-terahertz
- Active and passive device modeling for accurate circuit implementation

Who can apply?
This Graduate Seminar is offered to advanced Master, PhD students and junior researchers in Electrical Engineering, Computer Science.

Fees & Grant Support
Full fee waiver scholarships are available for students from VIU member institutions. In addition, grant support is available to support partially or fully the costs of international travel. Accommodation is provided free of charge.
The participation fee for students of non-member institutions is Euro 1.150 VAT included. The fee is inclusive of tuition, course materials, accommodation, lunches, social events and taxes. Students from non-member institutions are not eligible for VIU grant support. VIU Alumni are eligible for a reduced fee.

Credits
Participation in the Graduate Seminar is considered equivalent to **2 ECTS**.

The program is available on the VIU website.

Applications
December 2, 2025– May 4, 2026 via the VIU website

Applicants must submit the application form, a letter of motivation – which should include a brief description of the candidate's research interests, a curriculum vitae, and a photo.

VIU Graduate Seminars
These are thematic intensive seminars given in a concentrated period on subjects of universal interest, open to a broad spectrum of disciplines. They are suited to both Master's and PhD students as well as junior researchers and are open to candidates from all the VIU member institutions. The young researchers will receive support in defining their research proposal. Significant cooperation among departments in the member institutions is expected.

Venice International University is a consortium of 23 institutions, representing 14 countries throughout the world. The mission of VIU is to foster cooperation among VIU member institutions while facilitating the exchange of knowledge and ideas, by developing, promoting and organizing joint academic, research, and training/capacity-building programs. Students from non-member institutions may participate in selected academic programs. The academic programs at VIU are distinguished by a markedly interdisciplinary approach to the topics, and by the international perspectives that the participants contribute to the discussions. The VIU campus is on the island of San Servolo in Venice, Italy.

Location

VIU graduate seminar

Venice International University
Isola di San Servolo
30133 Venice
Italy
T +39 041 2719511
F +39 041 2719510
E summerschools@univiu.org
www.univiu.org