5G Technology (Certificate)

5G is the wireless data communications system that will replace the 4G LTE systems currently in use around the world. However, 5G is not an update on 4G. It is a radically new system, using many different architectures, algorithms, circuits, chips and antennas than the previous system. 5G will enable faster streaming to mobile devices with theoretical speeds of up to 10 Gb/s as well as enabling the next generation of the Internet of Things.

As industry is working at a breakneck pace to build out these systems, there is a high demand for engineers who are fluent in the technological challenges and opportunities of this generational leap to 5G.

With a certificate in 5G Technologies, you will be well-equipped to work at the forefront of pivotal technology powered by advanced and advancing communications technologies.

Plan of Study

The 5GT GCP requires a total of 12 credit hours consisting of four graduate-level Electrical and Computer Engineering courses taken for a letter grade. Courses labeled “EOL” will be offered both as live classes and through EOL. Those without “EOL” are only offered to on-campus students. To view a full list of Electrical and Computer Engineering certificate degrees and courses, please visit their department website (https://ece.ncsu.edu/grad/certificate/).

More Information

5G Technologies Program Website (https://www.ece.ncsu.edu/grad/certificate/)

Distance Website (https://online-distance.ncsu.edu/program/5g-technology/)

Application Information

Students must meet ONE of the following requirements for admission into the 5G Graduate Certificate Program:

- Have a BS degree in Electrical or Computer Engineering from a regionally accredited four-year college or university, and have an overall GPA of at least 3.0 on a 4-point scale.
- Have a BS degree in the sciences or engineering from a regionally accredited four-year college or university with an overall GPA of at least 3.0 on a 4-point scale.
- Be a degree-seeking student in good standing in an NC State University graduate program in the sciences or engineering.

Applicant Information

- **Delivery Mode:** On Campus, Online, Hybrid
- **Entrance Exam:** None
- **Interview Required:** None

Application Deadlines

- **Fall:** January 9
- **Spring:** July 1

Plan Requirements

Students may choose from the course tracks below to complete coursework within a focus area.

Certificates earned will be distributed as: "Graduate Certificate in 5G Technologies" without focus area track specifications.

Code	Title	Hours	Counts towards
Required Courses		**12**	
ECE 592	Special Topics In Electrical Engineering (LTE and 5G Communications (EOL))		
Select a course sequence under any track area listed under "Focus Area Tracks"			
Total Hours		**12**	

Focus Area Tracks

Circuits

Code	Title	Hours	Counts towards
Course Sequence			
ECE 511	Analog Electronics		
ECE 712	Integrated Circuit Design for Wireless Communications		
ECE 792	Special Topics In Electrical Engineering (Design of Millimeter-Wave Circuits and Systems (EOL))		

Microwave Systems and Applied EM

Code	Title	Hours	Counts towards
Course Sequence			
ECE 524	Radio System Design		
ECE 549	RF Design for Wireless		
ECE 592	Special Topics In Electrical Engineering (Antennas and Arrays)		

Communications

Code	Title	Hours	Counts towards
Course Sequence			
ECE 575	Introduction to Wireless Networking		
ECE 766	Signal Processing for Communications & Networking		
ECE 570	Computer Networks		

Faculty

Full Professors

David E Aspnes

B. Jayant Baliga

Mesut E. Baran

Salah M. A. Bedair

Subhashish Bhattacharya

Donald L. Bitzer

Alper Yusuf Bozkurt

Gregory T Byrd

Rada Yuryevna Chirkova

Mo-Yuen Chow

Huaiyu Dai

William Rhett Davis

Alexandra Duel-Hallen

Michael James Escuti

Do Young Eun

Brian Allan Floyd

Paul D. Franzon

Edward F. Gehringer

John J. Grainger

Edward Grant

Robert Wendell Heath

Brian L Hughes

Iqbal Husain

Sabre Kais

Derek Kamper

Ki Wook Kim

Frederick Anthony Kish Jr.

Robert Michael Kolbas

Hamid Krim

Ning Lu

Srdjan Miodrag Lukic

Leda Lunardi

Thomas Kenan Miller III

Veena Misra

Rainer Frank Mueller

John F. Muth

H. Troy Nagle Jr.

Jagdish Narayan

Arne Nilsson

Omer Oralkan

Mehmet Cevdet Ozturk

Harilaos George Perros

Douglas Stephen Reeves

Eric Rotenberg

Georgios Rouskas

Xipeng Shen

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Ioannis Viniotis

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Wenye Wang

Jonathan Wierer

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Aranya Chakrabortty

Hantao Cui

Alexander G. Dean

Paschalis Gkoupidenis

Zhishan Guo

Ali Gurbuz

Sevgi Gurbuz

Ismail Guvenc

Khaled Abdel Hamid Harfoush

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Zeljko Pantic

Nuria Gonzalez Prelcic

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David Ricketts

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Muhammad Shahzad

Wenyuan Tang

Chau-Wai Wong

Tianfu Wu

Chenhan Xu

Man Ki Yoon

Kaixiong Zhou

Practice/Research/Teaching Professors

Jordan Besnoff

Gregory Edward Bottomley

Laura J Bottomley

James Paul Dieffenderfer

Robert Joseph Evans

John Gajda

Rachana Ashok Gupta

Seth E. Hollar

Douglas C. Hopkins

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Bongmook Lee

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Wilbur Carroll Peterson

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Sarah Ann Rajala

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Teaching Associate Professors

Mihail Cutitaru

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