BOSTON

THE REFLECTOR

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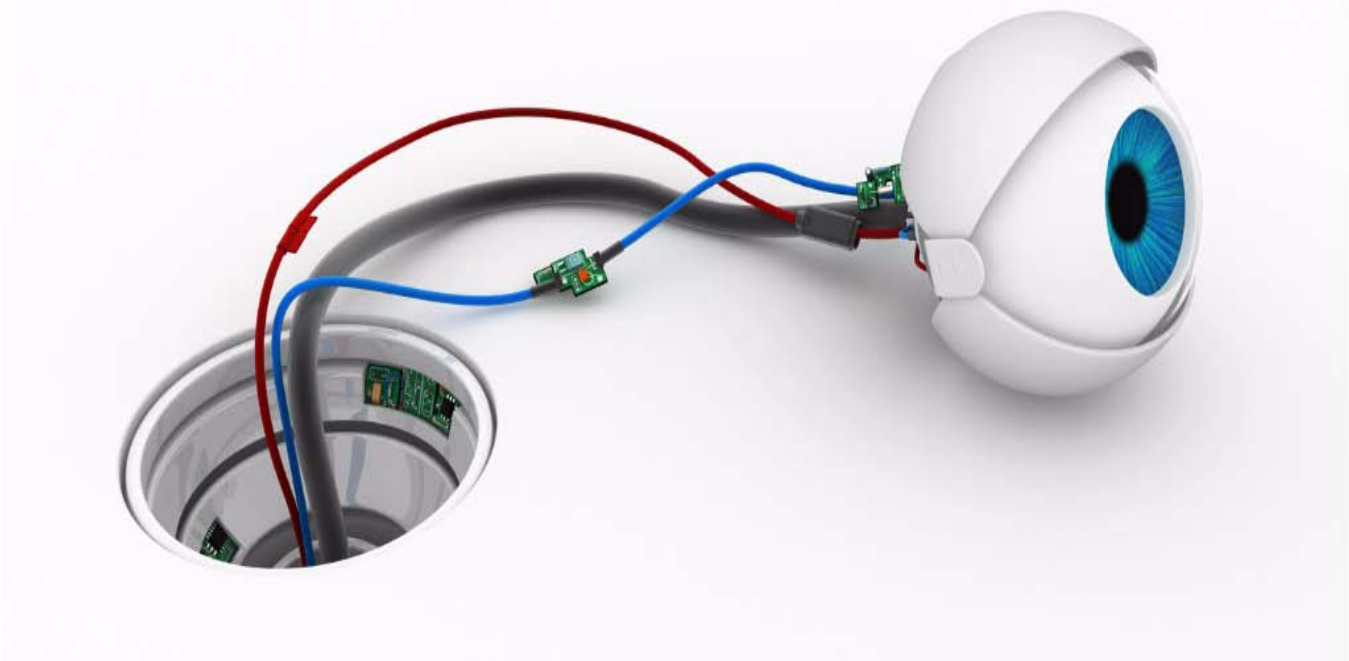

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The Better Half of 2020

by Ramon De la Cruz, Boston Section Chair

As we close the first half of 2020, while most people would be willing to echo “good riddance”, we have to be mindful of how much we have to look forward as things are already improving.

2020 will be described in the history books as an awful year around the world that has endured disruption of most human social activity beyond what was once conceivable.
Having heard stories from our family elders about how their parents had to endure hardships from the 1918 Spanish Flu pandemic and World Wars I and II with the shortages and restrictions that resulted from the redirection of resources to support the war effort, one could only imagine what it was like at the time.

However, even as everyone’s life has been impacted starting the first quarter of 2020, as the medical and scientific experts helped push public and private directives of staying at home and shutting down most commercial, service, and entertainment activities, technology has made a big difference.

While the lockdown has made individuals and families become isolated for months, the availability of smartphones with cameras, cross-platform video conferencing and 24-hour high-speed internet enabled a very large portion of the population to have ways to remain communicated in real-time and being able to perform most or all functions that usually take place in the office or work site.

Once again technology has helped mitigate some of the hardship and complications of the lockdown and has even helped some people start new ventures and businesses they never dreamed of.

The Boston Section activities, calendar of events, and meetings -not surprising- have also been impacted by the lockdowns. But once again technology has enabled the various leadership and planning committees to continue with their projects with the help of WebEx, Zoom, and other communication tools.

On May 28th the Boston Section Chapter coordination committee, chaired by Paul Zorfass with Denise Griffin (Boston Section Secretary/Treasurer) and Marie Tupaj (Boston Section Vice-chair) held the annual Chapter Leadership meeting with attendance from leaders and volunteers from most of the Boston Chapters and Affinity groups for discussions on Chapter collaboration, events planning and membership development.

Similarly, the recently formed Boston Section Artificial Intelligence committee held an online meeting to continue with the planning of a series of events in the upcoming months. More information about these events will be announced when the details have been finalized.

As the state slowly transitions through the various stages of reopening, the Boston Section will continue with the mission of serving the greater Boston area with events, training, and education with the help of technology.

We hope you have a fun and relaxed summer during the better half of 2020.

IEEE Boston Section Online Courses:

(Students have 90 day access to all online, self-paced courses)

Verilog101:Verilog Foundations
Full course description and registration at ,
http://ieeeboston.org/verilog-101-verilog-foundations-online-course/

System Verilog 101: Design Constructs
Full course description and registration at ,
http://ieeeboston.org/systemverilog-101-sv101-design-constructs-online-course/

System Verilog 102: Verification Constructs
Full course description and registration at ,
http://ieeeboston.org/systemverilog-102-sv102-verification-constructs-online-course/

High Performance Project Management
Full course description and registration at ,
http://ieeeboston.org/high-performance-project-management-online-course/

Introduction to Embedded Linux Part I
Full course description and registration at ,
http://ieeeboston.org/introduction-to-embedded-linux-part-i-el201-online-course/

Embedded Linux Optimization - Tools and Techniques
Full course description and registration at ,
http://ieeeboston.org/embedded-linux-optimization-tools-techniques-line-course/

Embedded Linux Board Support Packages and Device Drivers
Full course description and registration at ,
http://ieeeboston.org/embedded-linux-bsps-device-drivers-line-course/

Software Development for Medical Device Manufacturers
Full course description and registration at ,
http://ieeeboston.org/software-development-medical-device-manufacturers-line-course/

Fundamental Mathematics Concepts Relating to Electromagnetics
Full course description and registration at ,
http://ieeeboston.org/fundamental-mathematics-concepts-relating-electromagnetics-line-course/

Reliability Engineering for the Business World
Full course description and registration at ,
http://ieeeboston.org/reliability-engineering-business-world-line-course/

Design Thinking for Today's Technical Work
http://ieeeboston.org/design-thinking-technical-work-line-course/

Fundamentals of Real-Time Operating Systems
http://ieeeboston.org/fundamentals-of-real-time-operating-systems-rt201-on-line-course/

Call for Articles

Now that the Reflector is all electronic, we are expanding the content of the publication. One of the new features we will be adding are technical, professional development, and general interest articles to our members and the local technology community. These will supplement the existing material already in our publication.

Technical submissions should be of reasonable technical depth and include graphics and, if needed, any supporting files. The length is flexible; however, a four to five page limit should be used as a guide. An appropriate guide may be a technical paper in a conference proceeding rather than one in an IEEE journal or transaction.

Professional development or general interest articles should have broad applicability to the engineering community and should not explicitly promote services for which a fee or payment is required. A maximum length of two to three pages would be best.

To ensure quality, technical submissions will be reviewed by the appropriate technical area(s). Professional/interest articles will be reviewed by the Publications Committee for suitability.The author will be notified of the reviewers' decision.

The Reflector is published the first of each month. The target submission deadline for the articles should be five weeks before the issue date (e.g., June 1st issue date; article submission is April 27). This will allow sufficient time for a thorough review and notification to the author.

We are excited about this new feature and hope you are eager to participate!
Submissions should be sent to;
ieeebostonsection@gmail.com

Call for Course Speakers/Organizers

IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity. The IEEE Boston Section, its dedicated volunteers, and over 8,500 members are committed to fulfilling this core purpose to the local technology community through chapter meetings, conferences, continuing education short courses, and professional and educational activities.

Twice each year a committee of local IEEE volunteers meet to consider course topics for its continuing education program. This committee is comprised of practicing engineers in various technical disciplines. In an effort to expand these course topics for our members and the local technical community at large, the committee is publicizing this CALL FOR COURSE SPEAKERS AND ORGANIZERS.

The Boston Section is one of the largest and most technically divers sections of the IEEE. We have over 20 active chapters and affinity groups.

If you have an expertise that you feel might be of interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is **http://ieeeboston.org/course-proposals/** . Alternatively, you may contact the IEEE Boston Section office at ieeebostonsection@gmail.com or 781 245 5405.

- **Honoraria can be considered for course lecturers**
- Applications oriented, practical focused courses are best (all courses should help attendees expand their knowledge based and help them do their job better after completing a course
- Courses should be no more than 2 full days, or 18 hours for a multi-evening course
- Your course will be publicized to over 10,000 local engineers
- You will be providing a valuable service to your profession
- Previous lecturers include: Dr. Eli Brookner, Dr. Steven Best, Colin Brench, to name a few.

IEEE Boston Section Social Media Links:

Twitter: https://twitter.com/ieeeboston

Facebook: https://www.facebook.com/IEEEBoston

YouTube: https://www.youtube.com/user/IEEEBostonSection

LinkedIn: https://www.linkedin.com/groups/IEEE-Boston-Section-3763694/about

The IEEE High Performance Extreme Computing Conference (HPEC 2020) will be held in the Greater Boston Area, Massachusetts, USA on 22 – 24 September 2020. IEEE HPEC will have virtual conference options that allow safe participation and full publication in the IEEE Digital Xplore Library!

Presentations that describe advances in high performance extreme computing technologies will be presented at this conference which is to be the premier conference in the world on the confluence of HPC and Embedded Computing.

Confirmed Distinguished Speakers include:

- Dr. Yudong Cao (Zapata Computing) - *Advances in Algorithms for Near-Term Quantum Computer*
- Dr. Jeffrey Chou and Dr. Suraj Bramhavar (Sync Computing) - *The Need for Hardware-Accelerated Combinatorial Optimization*
- Dr. John Feo (PNNL) - *The Need for Integrated Analytic Platforms and Multithreaded Runtime Systems*
- Prof. Sigal Gottlieb (UMass Dartmouth Mathematics) - *High Order Efficient Methods for Black Hole Simulations*
- *More to come!*

GraphChallenge submission deadline is July 15, 2020 – SUBMIT NOW!

Challenges such as YOHO, MNIST, HPC Challenge, ImageNet, and VAST have played important roles in driving progress in fields as diverse as machine learning, high performance computing, and visual analytics.

GraphChallenge encourages community approaches to developing new solutions for analyzing graphs and sparse data derived from social media, sensor feeds, and scientific data to enable relationships between events to be discovered as they unfold in the field.

IEEE-HPEC.ORG

DSP for Software Radio

(This course consists of 10, 1.5 hour sessions)

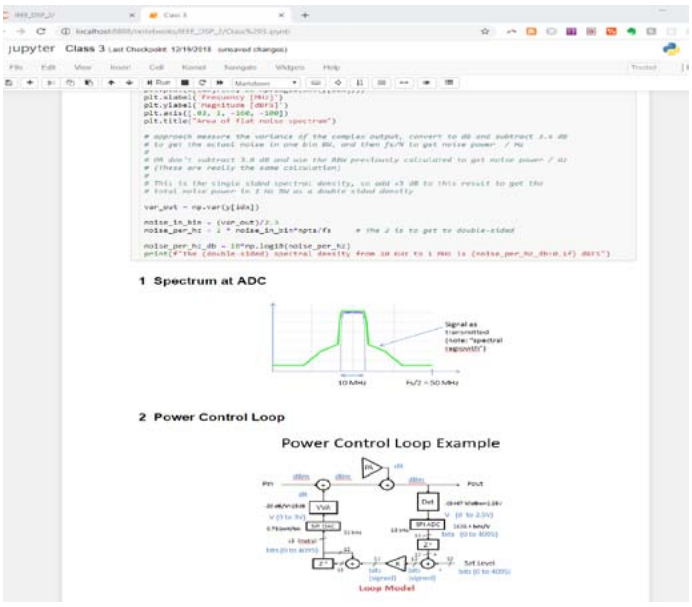
Time & Date: 6:30 - 8PM EDT, Tuesdays: July 28, August 4, 11, 18, 25
6:30 - 8PM EDT, Thursdays: July 30, August 6, 13, 20, 27

Location: Live, Interactive Webinar

Speaker: Dan Boschen

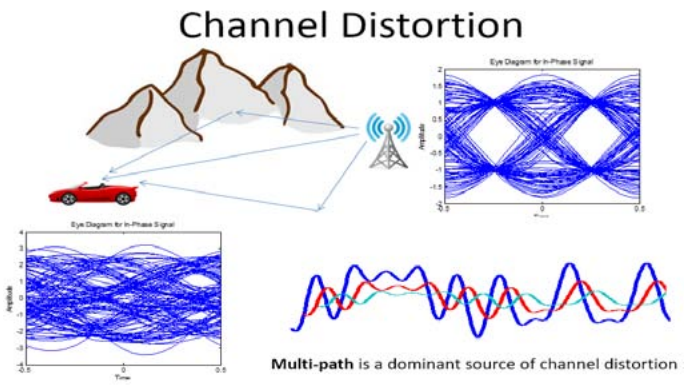
Course Summary

This course builds on the IEEE course “DSP for Wireless Communications” also taught by Dan Boschen, further detailing digital signal processing most applicable to practical real-world problems and applications in radio communication systems. Students need not have taken the prior course if they are familiar with fundamental DSP concepts such as the Laplace and Z transform and basic digital filter design principles. The course title has been changed with some minor additions but this is the same course that was previously taught titled “More DSP for Wireless Communications”, with the addition of Python demonstrations using Jupyter Notebooks.



This course brings together core DSP concepts to address signal processing challenges encountered in radios and modems for modern wireless communications. Specific areas covered include carrier and timing recovery, equalization, automatic gain control, and considerations to mitigate the effects of RF and channel distortions such as multipath, phase noise and amplitude/phase offsets.

Dan builds an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and real-world applications



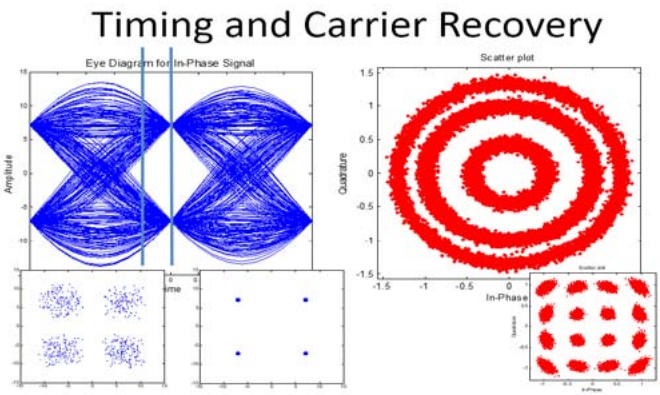
for mixed signal (analog/digital) modern transceivers. This course is applicable to DSP algorithm development with a focus on meeting practical hardware development challenges, rather than a tutorial on implementations with DSP processors.

Now with Jupyter Notebooks!

This long-running IEEE Course has been updated to include Jupyter Notebooks which incorporates graphics together with Python simulation code to provide a “take-it-with-you” interactive user experience. No knowledge of Python is required but the notebooks will provide a basic framework for proceeding with further signal processing development using that tools for those that have interest in doing so.

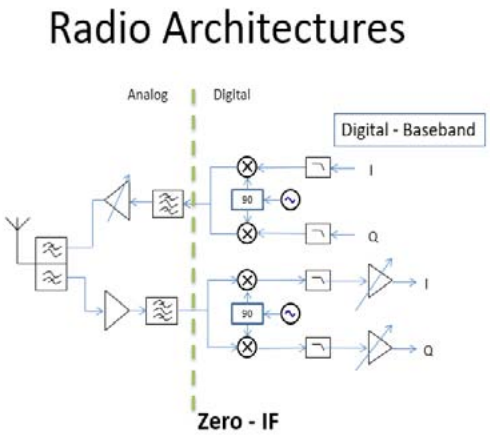
This course will not be teaching Python, but using it for demonstration. A more detailed course on Python itself is covered in a separate IEEE Course "Python Applications for Digital Design and Signal Processing".

Students will be encouraged but not required to install the Anaconda Python distribution. All set-up information for installation will be provided prior to the start of the course.



Target Audience:

All engineers involved in or interested in signal processing for wireless communications. Students should have either taken the earlier course "DSP for Wireless Communications" or have been sufficiently exposed to basic signal processing concepts such as Fourier, Laplace, and Z-transforms, Digital filter (FIR/IIR) structures, and representation of complex digital and analog signals in the time and frequency domains. Please contact Dan at boschen@loglin.com if you are uncertain about your background or if you would like more information on the course.



Benefits of Attending/ Goals of Course:

Attendees will gain a strong intuitive understanding of the practical and common signal processing implementations found in modern radio and modem architectures and be able to apply these concepts directly to communications system design.

Topics / Schedule:

Sessions 1A&1B: DSP Review, Radio Architectures, Digital Mapping, Pulse Shaping, Eye Diagrams

Sessions 2A&2B: ADC Receiver, CORDIC Rotator, Digital Down Converters, Numerically Controlled Oscillators

Sessions 3A&3B: Digital Control Loops; Output Power Control, Automatic Gain Control

Sessions 4A&4B: Digital Control Loops; Carrier and Timing Recovery, Sigma Delta Converters

Sessions 5A&5B: RF Signal Impairments, Equalization and Compensation, Linear Feedback Shift Registers

Speaker's Bio:

Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 years of experience in system and hardware design for radio transceivers and modems. He has held various positions at Signal Technologies, MITRE, Airvana and Hittite Microwave designing and developing transceiver hardware from baseband to antenna for wireless communications systems. Dan is currently at Microchip (formerly Microsemi and Symmetricom) leading design efforts for advanced frequency and time solutions.

For more background information, please view Dan's Linked-In page at:
http://www.linkedin.com/in/danboschen

Registration Rates	
IEEE Members	**$190**
Non-members	**$210**

http://ieeeboston.org/digital-signal-processing-dsp-wireless-communications-radio/

Software Development for Medical Device Manufacturers

Web-based Course with live Instructor!

(12.5 hours of instruction!)

Times & Dates: 1:00 - 4:PM EDT; October 19, 20, 21, 22

Speaker: Steve Rakitin

This course will be presented with a live instructor using web-meeting software. The course content will be covered in 4 sessions presented over four days.

COURSE SUMMARY

Developing software in compliance with the FDA Design Control regulation, changing FDA guidance documents and latest international standards is challenging. This intensive course provides practical solutions and suggestions for developing software in a manner that meets applicable FDA regulations, guidance documents and international standards, such as IEC-62304:2015. The focus is on interpreting Design Controls for software. Each section of the Design Controls regulation (820.30) is discussed from the perspective of software development. Discussions on key topics such as Software Requirements, Traceability, Design Reviews, Software Verification & Validation and Risk Management (including recently updated standards ISO-14971:2019 and EN-14971:2019) are included. Also discussed are FDA requirements for validation of software development tools and software used in Manufacturing and Quality Systems. Also discussed are recent FDA Guidance Documents on Cybersecurity, Mobile Apps, and Usability.

THIS COURSE IS INTENDED FOR…

Software engineers, project managers, quality managers, software quality professionals, RA/QA staff, and anyone who needs to develop cost-effective processes and procedures that will enable their organizations to deliver high quality software-based medical devices that comply with FDA regulations and international standards. This course is also appropriate for people who are new to the medical device industry.

COURSE MATERIAL

Course notes, access to an extensive collection of reference documents and a training certificate will be provided.

COURSE OUTLINE

This course will be presented with a live instructor using web-meeting software. The course content will be covered in 4 sessions as described below. Please note that duration of each session may slightly change depending on the number of questions posed to the instructor.

AGENDA

SESSION 1 – Regulatory Context
Duration ~3 hours with one 15 min break
This session will cover key regulatory requirements for medical device software in the US and EU.

Regulations and Guidance:
• FDA Medical Device Regulation (21 CFR Part 820 – specifically, design controls)
• EU Medical Device Regulation
• FDA Guidance Documents:
o Guidance for Content of Pre-market Submissions for Medical Devices Containing Software
o Off-the-Shelf Software Use in Medical Devices
o General Principles of Software Validation
o Content of Premarket Submissions for Management of Cybersecurity in Medical Devices
o Policy for Software Device Functions and Mobile Medical Applications
o Applying Human Factors and Usability Engineering to Medical Devices
• International Standards:
o ISO 13485:2016 Medical Devices – Quality Management Systems

o IEC 62304: 2015 Medical Device Software – Software Lifecycle Processes
o ISO 14971: 2019 Application of Risk Management to Medical Devices
o EN 14971: 2019 Application of Risk Management to Medical Devices
• Off-the-Shelf (OTS) Software and Open Source software (SOUP)
• Discussion: All Software Is Defective…

SESSION 2 – FDA Design Controls and IEC 62304 – Part 1 Duration ~2.5 hours with one 15 min break

This session will cover FDA Design Controls and IEC 62304 requirements for medical device software.
• Design and Development Planning
o How does Agile Development fit?
o Medical Device Software Lifecycle Processes
• Risk Management
o FDA Levels of Concern
o IEC 62304 Software Safety Classification
• Software Requirements
o Techniques for Removing Ambiguity from Requirements
• Software Architecture and Design
• Software Design Changes

SESSION 3 – FDA Design Controls and IEC 62304 – Part 2 Duration ~2.5 hours with one 15 min break

This session will cover Software Verification and Validation requirements.
• Software Implementation
• Software Verification
o Technical Reviews
o Static Analysis
o Unit and Integration Testing
• System Testing
• Software Validation Testing

SESSION 4 – Software Tool Validation and Risk Management Duration ~2.5 hours with one 15 min break

This session will cover Software Tool Validation and Risk Management requirements.
• Software Tool Validation
o Deciding which tools need to be validated
o Validation approach for software tools
• Validation of Manufacturing Software and Quality System Software
• Risk Management Using Fault Tree Analysis (FTA)
o Review of ISO/EN 14971:2019 Requirements
o Example of Fault Tree Analysis and Failure Modes Effect Criticality Analysis (FMECA)

Course Cancellation and Refund Policy: Requests for online course cancellations must be received 3 business days prior to the course date for a full refund. Once course materials have been shared with a participant, a cancellation request cannot be accommodated.

About the instructor…

Steven R. Rakitin has over 40 years experience as a software engineer and software quality manager. He helped write the first IEEE Software Engineering Standard (IEEE-STD-730 Standard for Software Quality Assurance Plans) and worked on revisions to both IEEE Standard 1012-2012 (Software Verification & Validation) and IEEE 730-2014 (Software Quality Assurance). He has written several papers on software quality as well as a book titled: Software Verification & Validation for Practitioners and Managers. He received a BSEE from Northeastern University and an MSCS from Rensselaer Polytechnic Institute. He earned certifications from the American Society for Quality (ASQ) as a Software Quality Engineer (CSQE) and Quality Auditor (CQA). He is a Senior Life Member of the IEEE. As President of Software Quality Consulting, he helps medical device companies comply with FDA regulations, guidance documents, and international standards in an efficient and cost-effective manner.

Decision (Run/Cancel) Date for this Course is Monday, October 12, 2020

IEEE Members	**$285**
Non-members	**$345**

http://ieeeboston.org/event/live-course-software-development-for-medical-device-manufacturers/?instance_id=2862

Latest Insights in RF Amplifier Design from World's Leading Experts – Fundamentals and Applications

(10 hours of instruction!)

Time & Date: **6 – 8PM EDT, Tuesdays, September 29, October 6, 13, 20, 27, November 3**

Live Interactive Webinar!

Course summary/overview:

This six week lecture series is intended to give a broad overview of state-of-the-art RF PA techniques with practical aspects for working professionals together with students for future RF PA designers, from fundamentals to applications. It begins with a review of RF power amplifier concepts then teaches handset PA design techniques, issues and solutions faced with designing RF PAs for mobile applications. It also discusses high efficiency amplifier structures with different classes of operation, and other architectures. A high linearity techniques lecture with behavioral modelling will follow. GaAs/GaN MMIC level millimeter-wave amplifier design tutorials and techniques will be lectured including foundry/technology selection, loadpull, loadline analysis and simulations with EDA tools. Lastly, digital perspective transmitters will be presented using GaN technology together with FPGA and ASICs.

The platforms currently being considered for the course are MS Teams and Zoom and attendees should be prepared to access the course by both platforms.

Benefits of attending:

This course will give a broad overview of state-of-the-art RF PA techniques with practical aspects to help sharpen current skill sets as well as initiate the RF PA design with better confidence.

Target Audience/who should attend:

RF engineer professionals and prospective RF amplifiers / RFIC design students

Outline

RF Amplifier Basics – (9/29/2020)
by Dr. Nestor Lopez at MIT Lincoln Laboratory
RF Power Amplifier Design for Mobile Applications – (10/06/2020) - by Dr. Douglas Teeter at Qorvo

Digital Transmitter – (10/13/2020)
by Dr. Rui Ma at Mitsubishi Electric Research Labs

High-Efficiency RF Power Amplifiers Architecture – (10/20/2020)
by Dr. Nestor Lopez at MIT Lincoln Laboratory

High Frequency RF Amplifiers MMIC Design with GaAs/GaN pHEMT with EDA tools - (10/27/2020)
by Dr. Youngho Suh at MIT Lincoln Laboratory

Behavioral Modeling and Linearization of RF Power Amplifiers – (11/03/2020)
by Dr. Kevin Chuang at NanoSemi, Inc.

Decision (Run/Cancel) Date for this Courses is Monday, September 21

IEEE Members	**$195**
Non-members	**$235**
Full Time Students (members)	**$75**
Full Time Students (non- members)	**$95**

http://ieeeboston.org/event/latest-insights-in-rf-amplifier-design/?instance_id=2845

Mark Your Calendar!

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PCB/ Interconnect Design

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Signal Integrity/ Power Integrity

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