

Professional Diploma in Radio Frequency Engineering

January – July 2010 (Friday & Saturday)

An application has been submitted to the New Technology Training Scheme for each module to get endorsed. If successful, eligible participants may obtain up to 50% of training fee refund from NTTS.

Background

Jointly organized by **Hong Kong Productivity Council**, **Lexiwave Technology (Hong Kong) Ltd.** and **Hong Kong Science and Technology Parks Corporation**, this course aims to provide participants with an insightful training on RF Engineering from a practical, industrial perspective. Participants will be led through a systematic, theoretical presentation with case studies on commercial products in the training.

The programme aims to provide engineers the fundamental principles of Radio Frequency (RF) engineering as well as practical RF design techniques so that upon completion of the study, they are able to apply RF design skills directly to their work in the electronics or RF industry.

The course will be conducted by RF experts with rich local and overseas industrial experience. It is suitable for RF professionals who want to keep up-to-date their skills and knowledge in RF Engineering and stay competitive.

Who Should Attend

RF Designers, Wireless Product Designers, Field Application Engineers, Design Managers, Business Development Engineers and Managers and related professionals.

Organizers:



Co-organizer:



Supported by:



Please circulate this leaflet to those who are interested.

Advanced & Manufacturing Technology



Course Structure

The course comprises of 4 modules with a total of 156 hours. They are :

Module 1 : Radio Frequency Design Techniques and Radio Frequency System Design
(15 Jan – 27 Feb 10)

Module 2 : Radio Frequency Circuit & PCB Design (5 Mar– 23 Apr 10)

Module 3 : Antenna Design & RF Measurement (24 Apr – 12 Jun 10)

Module 4 : EMC and Design Project (18 Jun – 24 Jul 10)

Attendance certificate will be issued to participants who have only attended individual modules.

About the Instructors

Dr C.M. Yuen received his B.Eng. and Ph.D degrees in Electronic Engineering from the City University of Hong Kong. His research interest is mainly in the design of RF and Microwave circuits for low voltage and low power consumption wireless systems. He has twenty-one years of experience in RF product design and manufacturing in Hong Kong and Mainland China. Dr Yuen is currently an advisory engineer in the field of HDTV and IPTV.

Mr Henry Lau received his M.Sc. and MBA degrees from UK and USA respectively. He has more than 21 years of experience in designing RF systems, products and RFICs in both Hong Kong and US. He worked for Motorola and Conexant in US as Principal Engineer on developing RFICs for cellular phone and silicon tuner applications. Mr Lau holds five US patents and has one patent pending. He is currently running Lexiwave Technology Ltd., a fabless semiconductor company in Hong Kong and US designing and selling RFICs.

Medium of Instruction

Cantonese (with English terminology)

Award of Certificate

A **Certificate of Completion** will be awarded to participants who have attended **each Modules training**.

A **Diploma Certificate** will be awarded to participants who have attended **all Modules training**.

Date 15 January to 24 July 2010 (Every Fridays & Saturdays)

Time 7:00pm – 10:00pm (Friday), 2:00pm – 5:00pm (Saturday)

Duration 156 hours (39 hours each Module)

Venue 1/F., HKPC Building, 78 Tat Chee Avenue, Kowloon

Course Fee (including course materials)

Full Course : HK\$28,000

Each Module: HK\$7,000

Enrolment Procedures

- To enroll, please fill out the attached enrollment form and **FAX to 3187 4534** for seat **reservation**.
- Crossed cheque made payable to “**Hong Kong Productivity Council**” should be sent to –
Ms. Catherine Lam, PTI, 3/F, 78 Tat Chee Avenue, Kowloon Tong, Hong Kong Productivity Council
for seat **confirmation**.

Enquiry: Hong Kong Productivity Council

☎ 2788 - 5948 Mr. KK Yim

☎ 2788 - 5563 Ms. Catherine Lam

Lexiwave Technology (Hong Kong) Limited

☎ 2144-2592 Mr. Henry Lau

Seat Reservation Fax: ☎ 3187 4534

Email: catlam@hkpc.org

Seat Reservation Fax: ☎ 2144 – 2595

Email: henry.lau@lexiwave.com



Enrolment Form 報名表

Please complete in Block letters 請以正楷填寫

1. Course 課程 Professional Diploma in Radio Frequency Engineering
- Course Fee 學費 HK\$7,000 Module 1 **Radio Frequency Design Techniques and Radio Frequency System Design**
 HK\$7,000 Module 2 **Radio Frequency Circuit & PCB Design**
 HK\$7,000 Module 3 **Antenna Design & RF Measurement**
 HK\$7,000 Module 4 **EMC and Design Project**
 HK\$28,000 (Full Course)
- Duration 日期 _____ Course Code 課程編號 _____
2. Name (English) (Mr/Mrs/Ms*) _____ 姓名 (中文) (先生/女士/小姐*) _____
- Mobile / Pager 手提 / 傳呼機 _____ E-mail Address 電郵地址 _____
3. Organization (English) _____ 公司名稱 (中文) _____
- Position 職位 _____
- Mailing Address 通訊地址 _____
- Tel 電話 (Day 日間) _____ (Night 晚間) _____ Fax 傳真 _____

4. **Payment Method 付款方法**

<p>(A) By Credit Card (No.): _____ - _____ - _____ - _____</p> <p>Please debit my credit card A/C for HK\$ _____</p> <p>Signature _____</p>	<p>Expiry Date 有效日期 ____ (yy) ____ (mm)</p> <p>Name of Cardholder _____</p> <p><input type="checkbox"/> VISA <input type="checkbox"/> MASTER</p> <p>Date _____</p>
<p>(B) Enclosed is my cheque of HK\$_____. Cheque No._____. (The cheque has to be crossed and made payable to the "Hong Kong Productivity Council.")</p>	

**** For cheque payment, please send the cheque for the appropriate fee with this completed form to Productivity Training Institute, 3/F., Hong Kong Productivity Council, HKPC Building, 78 Tat Chee Avenue, Kowloon Tong, Kowloon (Attn: Ms. Catherine Lam)**

** For reservation (if applicable), please fax the completed form to (852) 2788 5567.

IMPORTANT NOTE 注意:

21.9.07

1. Course fee must accompany this form (or its photocopy), otherwise enrolment may be rejected.
報名表(可用影印本)必須連同學費一併繳交, 否則報名可能無效。
2. HKPC has adopted a Personal Data (Privacy) Policy. Information about the policy is available at HKPC enrolment counters for collection. You may also contact our Personal Data Controlling Officer for further details.
本局已實施個人資料(私隱)政策, 有關資料單張可於報名處索閱, 或閣下可與本局個人資料管理主任查詢。
3. Applicants are encouraged to pay by credit cards, EPS or cheques, if possible. Amount received will be imprinted. Cheques are subject to bank clearance.
本局建議申請者以信用卡、易辦事或支票繳交學費。學費收據以本局機印方為有效, 支票收妥作實。
4. Enrolment fee is not refundable unless HKPC is notified in writing of your withdrawal at least 5 working days before the course commences. A handling charge of HK\$200 will also be levied.
除非本局於課程開始前最少五個工作日收到申請者書面通知退學, 否則已繳學費概不退還。申請者申請退還學費需繳交手續費二百元正。
5. An applicant may, subject to approval from HKPC, nominate a person to attend the course on his/her behalf.
申請者可提名他人代替其本人出席課程, 惟事先須得本局同意。
6. HKPC reserves the right to reject any application in any circumstances and for whatever reasons. Payment of fees should only be construed as conditional acceptance of application.
香港生產力促進局保留在任何情況下及以任何原因拒絕任何入學申請的權利。申請者繳付學費後, 仍須符合入學的所有條件, 其申請方可獲得接納。
7. HKPC reserves the right to change the contents, venue and / or time as necessary.
香港生產力促進局保留在任何情況下更改課程內容、授課地點、日期及時間的權利。
8. Classes in the morning, afternoon or evening will be cancelled if typhoon signal No. 8 or above OR black rainstorm warning is still hoisted after (or is announced by the Hong Kong Observatory to be hoisted at/after) 6:00 a.m., 11:00 a.m. and 4:00 p.m. respectively. Participants will be notified when the class will be made up as soon as possible.

颱風及黑雨警告: 如課堂時間是在早上(9:00-12:00)、下午(2:00-5:00)或晚間(6:30-9:00), 將在下列情況下取消: (一)八號或以上颱風訊號或黑色暴雨警告訊號在早上 6:00、11:00 或下午 4:00 仍然懸掛; 或(二)香港天文台在早上 6:00、11:00 或下午 4:00 或之後, 宣佈將懸掛八號或以上颱風訊號或黑色暴雨警告訊號。本局將盡早通知學員補課的日期及時間。

Professional Diploma in Radio Frequency Engineering

Module 1 Radio Frequency Design Techniques and Radio Frequency System Design

15 Jan – 27 Feb 2010

An application has been submitted to the New Technology Training Scheme for this programme to get endorsed. If successful, eligible participants may obtain up to 50% of training fee refund from NTTS.

Course Content

<ul style="list-style-type: none">➤ Radio Frequency Design Techniques<ul style="list-style-type: none">- understanding of network parameter, H-, Y- & S-parameter and their relevance to RF circuit analysis and design- Smith chart principle and usage- Transmission line theory and application- Impedance matching, lumped and distributed networks- Frequency selection & filtering and system performance implications- Importance of decoupling and noise blocking in RF circuit design- Critical RF component selection- Importance of grounding in RF circuit and system design	<ul style="list-style-type: none">➤ Radio Frequency System Design<ul style="list-style-type: none">- Transmitter<ul style="list-style-type: none">Circuit blocks: oscillator, modulator, buffer amplifier, frequency multiplier, power amplifier, output filter. Major issues: C/N, modulation depth, voltage gain, power gain, power efficiency, harmonic prevention and suppression- Receiver<ul style="list-style-type: none">Circuit blocks: LNA, local oscillator, mixer, IF amplifier, demodulator, baseband amplifier, compander. Major Issues: Gain / intermodulation balance, bandwidth and noise, mixer gain, mixer efficiency, IF gain and bandwidth, baseband bandwidth, S/N optimization, current consumption- Frequency Synthesizer<ul style="list-style-type: none">Circuit Blocks: RF Oscillator, buffer amplifier, PLL chip, loop filter, quartz crystal oscillator. Major Issues: Phase noise, channel acquisition, programming technique, frequency stability: temperature, supply voltage, load pulling- Practical case studies on commercial RF products
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Module Aims

The aim of this module is to provide students a firm grounding on practical design techniques of RF engineering and design considerations on various functional blocks of RF systems from industry perspective. Designs on commercial products will be presented to the participants to gain in-depth and integral perspective on RF System Design. On completion of this module, students should be able to:

1. understand RF design theories including Smith chart, transmission line and Scattering parameters.
2. understand impedance matching and frequency selection, design of RF amplifier and network analyzer aided RF circuit design from a practical and industrial perspective
3. understand various building blocks in a RF system.
4. understand critical RF system design parameters and considerations
5. learn from practical case studies on commercial RF products

About the Instructors

Dr C.M. Yuen received his B.Eng. and Ph.D degrees in Electronic Engineering from the City University of Hong Kong. His research interest is mainly in the design of RF and Microwave circuits for low voltage and low power consumption wireless systems. He has twenty-one years of experience in RF product design and manufacturing in Hong Kong and Mainland China. Dr Yuen is currently an advisory engineer in the field of HDTV and IPTV.

Mr Henry Lau received his M.Sc. and MBA degrees from UK and USA respectively. He has more than 21 years of experience in designing RF systems, products and RFICs in both Hong Kong and US. He worked for Motorola and Conexant in US as Principal Engineer on developing RFICs for cellular phone and silicon tuner applications. Mr Lau holds five US patents and has one patent pending. He is currently running

Lexiwave Technology Ltd., a fabless semiconductor company in Hong Kong and US designing and selling RFICs.

Medium of Instruction

Cantonese (with English terminology)

Award of Certificate

A **Certificate of Completion** will be awarded to participants who have attended **each Modules training**.

A **Diploma Certificate** will be awarded to participants who have attended **all Modules training**.

Date 15 January to 27 February 2010 (Every Fridays & Saturdays)

Time 7:00pm – 10:00pm (Friday), 2:00pm – 5:00pm (Saturday)

Duration 48 hours

Venue 1/F., HKPC Building, 78 Tat Chee Avenue, Kowloon

Course Fee (including course materials) HK\$7,000

Professional Diploma in Radio Frequency Engineering

Module 2 - Radio Frequency Circuit and PCB Design

5 Mar – 23 Apr 2010

An application has been submitted to the New Technology Training Scheme for this programme to get endorsed. If successful, eligible participants may obtain up to 50% of training fee refund from NTTS.

Course Content

<ul style="list-style-type: none">➤ Radio Frequency Circuit Design<ul style="list-style-type: none">- RF amplifiers- RF oscillators- Receiver circuit design- Transmitter circuit design- Frequency synthesizer design- Power supply circuits- Computer Simulation	<ul style="list-style-type: none">➤ Printed Circuit Board Design<ul style="list-style-type: none">- From component selection to PCB design- component placement- Grounding and ground plane- Trace routing- Decoupling- EMC issues, noise reduction and isolation- PCB design of RF sub-circuit evaluation and prototyping- PCB design for mass production
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Module Aims

The aim of this module is to provide an opportunity for participants to acquire advanced knowledge on RF building block and PCB designs. On completion of this module, students should be able to:

1. understand design theories of RF building blocks.
2. understand RF circuit design techniques on RF amplifiers, oscillators and synthesizers.
3. learn the vital aspect and design considerations on RF PCB Layout.
4. gain in-depth and system perspective on RF PCB layout and design.

About the Instructors

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Medium of Instruction

Cantonese (with English terminology)

Award of Certificate

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Date 5 March - 23 April 2010 (Every Fridays & Saturdays)

Time 7:00pm – 10:00pm (Friday), 2:00pm – 5:00pm (Saturday)

Duration 48 hours

Venue 1/F., HKPC Building, 78 Tat Chee Avenue, Kowloon

Course Fee (including course materials) HK\$7,000

Professional Diploma in Radio Frequency Engineering

Module 3 - Antenna Design and RF Measurement

24 Apr – 12 Jun 2010

An application has been submitted to the New Technology Training Scheme for this programme to get endorsed. If successful, eligible participants may obtain up to 50% of training fee refund from NTTS.

Course Content

<ul style="list-style-type: none">➤ Antenna<ul style="list-style-type: none">- Radiation pattern, peak and notch- Antenna gain, directivity and aperture- Different types of antenna- Design of antennas- Antenna matching- Cables and connectors, mounting and soldering- Antenna test	<ul style="list-style-type: none">➤ Instrumental & Measurement<ul style="list-style-type: none">- Understand the specification and identifying critical parameters- Discrete component test- Equipment setup- Cables and connectors- Sub-circuit and module test- Network analyzer aided RF circuit design- Transmitter test : power, modulation and settle time- Receiver test : sensitivity and out-band rejection
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Module Aims

The aim of this module is to provide an opportunity for participants to acquire technical insights on vital aspects on antenna design and RF measurements . On completion of this module, students should be able to:

1. understand different types of commonly used antennas in wireless products.
2. understand design issues and tips from practical product design perspective.
3. measure impedance and design matching networks of antennas.
4. understand the fundamentals of RF measurement technologies and techniques.
6. perform RF equipment setup with minimum uncertainty
7. acquire the prerequisites on effective use of measurement instrumentation.

About the Instructors

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Medium of Instruction

Cantonese (with English terminology)

Award of Certificate

A **Certificate of Completion** will be awarded to participants who have attended **each Modules training**.

A **Diploma Certificate** will be awarded to participants who have attended **all Modules training**.

Date 24 April to 12 June 2010 (Every Fridays & Saturdays)

Time 7:00pm – 10:00pm (Friday), 2:00pm – 5:00pm (Saturday)

Duration 48 hours

Venue 1/F., HKPC Building, 78 Tat Chee Avenue, Kowloon

Course Fee (including course materials) HK\$7,000

Professional Diploma in Radio Frequency Engineering

Module 4 – EMC and Design Project

18 June – 24 July 2010

An application has been submitted to the New Technology Training Scheme for this programme to get endorsed. If successful, eligible participants may obtain up to 50% of training fee refund from NTTS.

Course Content

<ul style="list-style-type: none">➤ Electro-magnetic Compatibility<ul style="list-style-type: none">- EMI Source- EMI prevention and reduction- Grounding and shielding- Noise blocking and decoupling- Prevent and reduce harmonics and spurious emission in circuit design- Make use of permitted maximum emission in regulations- ESD and surge protection	<ul style="list-style-type: none">➤ Design Project<ul style="list-style-type: none">- Voltage controlled oscillator- Phase-locked-loop frequency synthesizer- Low Noise Amplifier- Mixer
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Module Aims

The first part of this module is to provide participants with an insightful training on product design for EMI/EMC compliance from a practical, industrial perspective. The second part of this module is to provide opportunities to enrich their real experience from circuit design to implementation. On completion of this module, students should be able to:

1. understand EMI/EMC approval process on consumer products
2. understand current and future regulatory trends.
3. understand design techniques pertaining to EMI/EMC compliance.
4. visit local EMI/EMC testing lab.
5. design a voltage controlled oscillator.
6. design a phase-locked-loop frequency synthesizer.
7. design a low noise amplifier or mixer.

About the Instructors

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Medium of Instruction

Cantonese (with English terminology)

Award of Certificate

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Date 18 June to 24 July 2010 (Every Fridays & Saturdays)

Time 7:00pm – 10:00pm (Friday), 2:00pm – 5:00pm (Saturday)

Duration 48 hours

Venue 1/F., HKPC Building, 78 Tat Chee Avenue, Kowloon

Course Fee (including course materials) HK\$7,000