LOCATION, LODGING AND COURSE DETAILS

Course Hours

Registration:
8:00am--8:30am
Course Hours:
8:30am--4:30pm
Note: fee includes breaks, lunches and course materials (lodging not included)

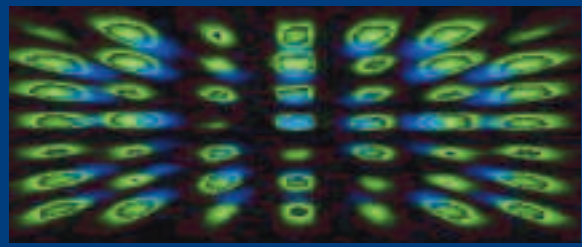
Course Location

All sessions take place at:
Johns Hopkins University (Montgomery County Campus)
9601 Medical Center Drive
Rockville, MD 20850
Phone: 301-294-7000
Web: www.jhu.edu
(search "Montgomery County Campus")

Lodging

Quality Suites
Shady Grove
3 Research Court
Rockville, MD 20850
Phone: 301-840-0200
Room Rate: $109.00
(mention UM-CPD)
Note: 5-minute shuttle to and from John Hopkins available upon request (make a reservation with the front desk)

Participants will receive a complimentary Infrared Handbook.



University of Michigan
College of Engineering

Center for Professional Development
2401 Plymouth Road, Suite A/B
Ann Arbor, MI 48105-2193

(734) 647-7200
(734) 998-6127 fax

http://cpd.engin.umich.edu

Register on the web!
http://cpd.engin.umich.edu

About the Center for Professional Development
The CPD offers public programs, onsite training, graduate distance learning and web-based training to engineering and technical professionals on a global basis. As part of the College of Engineering -- a top-five ranked school -- the CPD has access to some of the best minds in engineering. For program consultation, contact Jim Warren at (734) 647-7176.

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MichiganEngineering

University of Michigan
College of Engineering

Summer 2005 Short Course Series from Michigan Engineering

1. Fundamentals of INFRARED TECHNOLOGY: Systems and Applications

WASHINGTON D.C. AREA
June 6-8, 2005

2. ADVANCED INFRARED TECHNOLOGY AND SENSORS

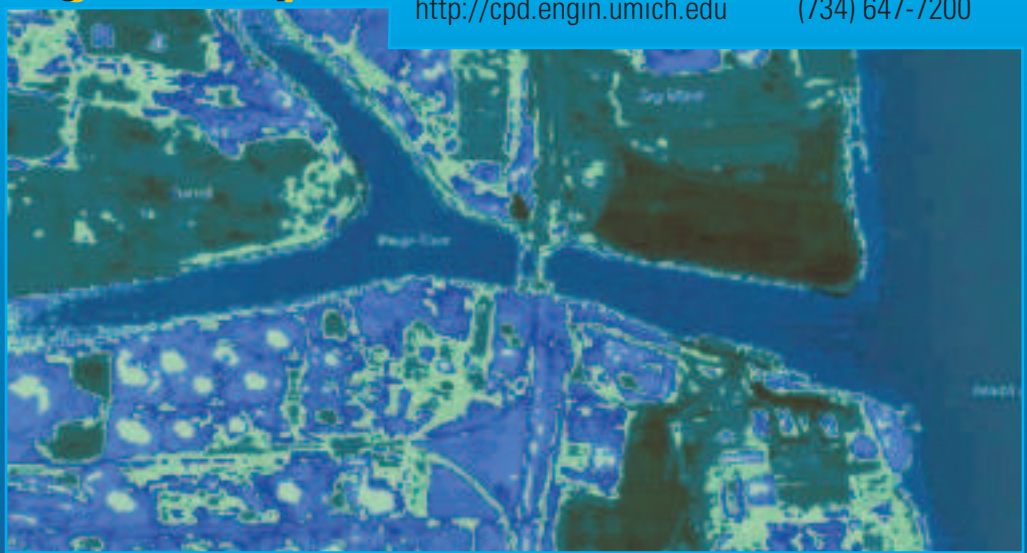
WASHINGTON D.C. AREA
June 9-10, 2005

3. SYNTHETIC APERTURE RADAR TECHNOLOGY AND APPLICATIONS

WASHINGTON D.C. AREA
June 13-15, 2005

Register Today!

1. By web: http://cpd.engin.umich.edu
2. By phone: (734) 647-7200



Learn More on Our Website

http://cpd.engin.umich.edu

1. Fundamentals of INFRARED TECHNOLOGY: Systems and Applications June 6-8, 2005

(COURSE FEE: $1,295 or attend both "Fundamentals" and "Advanced" for $2,195) • WASHINGTON D.C. AREA

Course Overview

Infrared is a maturing technology that enjoys a continuous rebirth of ideas and techniques. Starting with a basic survey of the field and concluding with the most current topics such as lasers, optical detector arrays, and hybrid devices, this course will provide participants with the understanding and ability needed to solve the technical and engineering problems encountered in working with infrared technology. A complete set of course notes detailing the lectures is provided. The companion course, Advanced Infrared Technology and Sensors, extends and elaborates on subjects covered in this beginning course.

Course Benefits

- Gain an understanding of infrared fundamentals and the basics necessary to design infrared systems
- Analyze the information related to the study of production and measurement of infrared energy
- Become conversant in current topics
- Provide a basis for trade-off for various infrared sensors in the SWIR, MWIR, and LWIR

Course Content

Radiation

- Infrared nomenclature
- Origin and propagation of infrared-radiation
- Characteristics of the atmosphere and its importance in infrared technology
- Band-models overview
- Techniques to correct for atmospheric effect, up-to-date modeling

Optics

- Optical principles
- Reflection, transmission, polarization
- Basic optical materials
- Bidirectional Reflectance Distribution Function (BRDF)
- Optical components and their incorporation into infrared subsystems

Detectors

- Physical characteristics of infrared detectors and their uses; detection mechanisms, noise limitations and figures of merit (D*, NEP, QE)
- Understand the figures of merits associated with IR systems
- Discuss recent detector technologies (QWIP, Uncooled, HgCdTe)

Infrared Systems

- Radiometers
- Spectrometers and interferometers
- Remote sensing, acquisition, and tracking

Introduction to Signal Processing

- Discrimination and matched filters
- Multispectral processing

Lasers

- Fundamental aspects and applications of lasers

Interest Group

Those who are or will be directly engaged in IR technology will find this course beneficial. In addition, this course is of value to those with indirect IR involvement, such as management personnel who will be making decisions on IR programs and want to be more knowledgeable, technicians with no IR experience who will be working with IR equipment, and persons in non-IR fields (e.g. radar) who will be involved in sensor fusion. Prerequisite: Bachelor's degree in either engineering or physics, or the practical equivalent.

Instructors

Anthony LaRocca, Ph.D., Research Physicist, General Dynamics, (formerly Veridian-ERIM)

George Zissis, Ph.D., Senior Research Physicist & Director Emeritus, Infrared Information and Analysis Center, ERIM

Lauren Peterson, Ph.D., Research Physicist, General Dynamics, Advanced Imaging Systems,

Eustace Dereniak, Ph.D., Professor, University of Arizona, Optical Sciences and Electrical and Computer Engineering, Optical Sciences Center

Rodney Anderson, Ph.D., Research Physicist and Director of IRIA Center, General Dynamics, (formerly Veridian-ERIM)

Participants will receive a complimentary Infrared Handbook.

"Very informative course."

"Overall, the course was worth my time and money."

"Quick pace, easy to follow."

Previous Participants

About the **CENTER FOR PROFESSIONAL DEVELOPMENT**

To schedule a consultation for all program options, contact (734) 647-7200 or shortcourses@umich.edu. The Center for Professional Development (CPD) is a world leader in providing lifelong learning for engineers and technical professionals. For over 45 years, CPD has served more than 100,000 participants with short courses, conferences and media based graduate degree programs. Short courses are offered around the world and can be customized and delivered in corporate settings both in person and by distance learning. Conferences are held throughout Michigan and beyond. Graduate degree programs are delivered to participants' work sites through distance learning technologies. CPD strives to identify training needs for organizations before training begins, and develops educational goals and objectives that are relevant and measurable. Whether an organization is seeking to update employee skills, or sharpen the skills of managers, CPD, in tandem with its employer partners, develops and delivers programs and services that enable any organization to become more effective, productive, and competitive.

Visit our web site at: http://cpd.engin.umich.edu

Interested in Six Sigma or Lean Manufacturing?

CPD has core competencies in these and many other productivity improvement topics. More details on our website at http://cpd.engin.umich.edu

Registration

Payment of Fee

Enrollment in CPD programs requires payment of fees or arrangements for payment prior to the start of program. Please mail check, purchase order or government contracts with your application and make them payable to the University of Michigan-CPD designating the name of the applicant(s) on the check. You may also fax the form below including pertinent information or register on-line at http://cpd.engin.umich.edu

Refunds and Cancellations

Due to the inherent costs of establishing, holding, and refilling participants slots along with associated costs of course materials, the Center for Professional Development has established the following cancellation charge schedule. Please note cancellation fees are based on the number of weeks from the course start date the written request is received; 4 weeks prior—10% of program fee; 3 weeks prior—50% of program fee; within 2 weeks—75% of program fee; no shows are liable for the full fee. All cancellation notices must be received in writing, either by mail, fax, or e-mail. CPD is not liable for travel expenses in the event of course cancellation (refundable airfare is recommended).

Continuing Education "Credits"

Although University graduate or undergraduate credits are not given for the engineering short course, participants do receive one Continuing Education Unit (CEU) for each ten contact hours of classroom participation. CEU "credits" are recognized as evidence of educational achievement and progress by numerous employers, industries, professional associations, and certification and licensing agencies. Many employers require employees to earn a certain number of CEU "credits" each year in order to stay current in their professions. At the conclusion of each course, participants are presented certificates indicating the number of CEU "credits" earned.

4 EASY WAYS TO REGISTER:

1) Register online at http://cpd.engin.umich.edu

2) Call 734-647-7200

3) Complete form and fax to: 734-998-6127

4) Mail: University of Michigan, Center for Professional Development
2401 Plymouth Road, Suite A/B
Ann Arbor, MI 48105-2193

❑ YES, I will register for:

SAVE MONEY! Register for both the "Fundamentals" and "Advanced" and SAVE!

I will attend the following courses:

- ❑ Fundamentals of INFRARED TECHNOLOGY: Systems and Applications • Washington DC Area • June 6-8, 2005 • Fee: $1,295
- ❑ Advanced Infrared Technology and Sensors • Washington DC Area • June 9-10, 2005 • Fee: $995
- ❑ Register me for both the "Fundamentals" and "Advanced" for the special Rate of $2,195
- ❑ Synthetic Aperture Radar Technology and Applications • Washington DC Area • June 13-15, 2005 • Fee: $1,295

Last Name_____ First Name_____

Title/Position_____

Organization & Division_____

Street Address_____

City_____ State/Country_____ Zip Code_____

Phone_____ Fax_____

Email_____

Indicate Method of Payment:

❑ Purchase Order #_____ ❑ Check Enclosed ❑ Visa ❑ Mastercard ❑ Am Ex

Card Number_____ Ex Date_____

Signature_____

Please enter mcode found by addressees name:_____

Please complete one registration form for each person attending. This form may be duplicated.

3. SYNTHETIC APERTURE RADAR: TECHNOLOGY AND APPLICATIONS June 13-15, 2005

(COURSE FEE: $1,295 • • WASHINGTON D.C. AREA)

Course Overview

The design, operation, application and interpretation of Synthetic Aperture Radar (SAR) systems and data are presented. Topics covered include: review of basic radar concepts, range-Doppler imaging of rotating objects, stripmap and spotlight SAR concepts, interferometric SAR, SAR satellite systems, and the technology used in image formation processing and exploitation of SAR data for terrain and ocean mapping. Automatic target recognition, surface and volume scattering, speckle in SAR images, image quality, calibration, polarimetrics and instrumentation are also covered. Course material is presented through lectures, discussions, and an afternoon workshop. The student is supplied a set of detailed lecture notes with color illustrations, and a workshop book with SAR images.

Course Content

Radar Systems

- Brief review of real aperture radar, imaging radars, strip mapping SARs, SARs suitable for imaging rotating objects, and spotlight SARs
- Design considerations: resolution, operating wave length, swath width, signal-to-noise ratio, and other parameters, including tradeoffs of these parameters
- Factors that limit operational performance of fine resolution SARs: ambiguity considerations, platform stability, and data processing
- Technologies of the construction of SARs at various wavelengths
- Polarmetric operation of microwave systems
- SAR interferometry
- Descriptions and applications of operational imaging radars

SAR Imagery

- Digital data processing algorithms and equipment being used for image formation processing and exploitation
- Geometry and scaling factors unique to side-looking radars
- Radiometric corrections
- Image quality and speckle effects
- Surface and volume scattering applications

Applications

- Automatic target recognition: detection through classification signature exploitation
- Terrain mapping, weather, clutter measurements
- Capability for surface motion measurement and 3-D mapping
- Utilization of SAR data to obtain ocean wave spectra, ocean current data, and other oceanographic applications, including examples using SEASAT, ERS-1, RADARSAT and SIR SAR data
- Capability for terrain, ice and vegetation classification

Interest Group

Persons responsible for the planning and direction of the design, operation and application of SAR instruments and those working in related areas.

Instructors

Robert A. Shuchman, Ph.D., Senior Vice President and Chief Technical Officer, Altarum

Christopher C. Wackerman, Ph.D., Director of the Ocean and Terrestrial Application Group, General Dynamics, (formerly Veridian-ERIM)

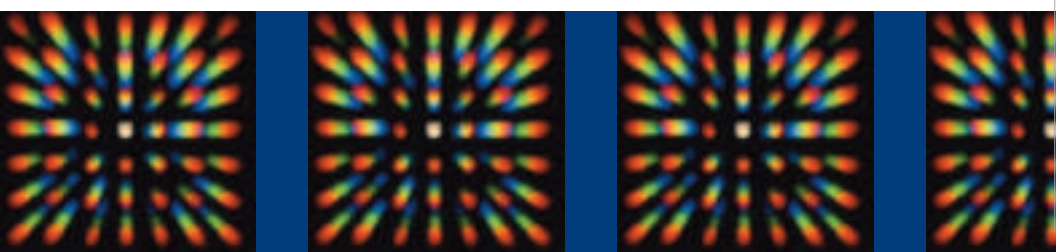
Nikola Subotic, Ph.D., Senior Scientist, Director of the Emerging Technology Group, Altarum

"Gives a great background and good theory. Tells good and bad aspects of different systems."

"Course delivery, professionalism of instructors, case studies/supporting data were all strengths."

"Course material was thorough and provided real life applications to theory."

Previous Participants



2. ADVANCED INFRARED TECHNOLOGY AND SENSORS

June 9-10, 2005

(COURSE FEE: $1295 or attend both "Fundamentals" and "Advanced" for $2,195) • WASHINGTON D.C. AREA

Course Overview

Modern commercial and military infrared/electro-optical systems require engineering founded upon advanced IR/EO technology. This technology spans atmospherics, target/ background models, the uses of focal plane arrays and signal processing methodologies. The course addresses future trends as well as the current status of IR/EO technology. A variety of applications will be discussed. If you have taken the Infrared Technology Fundamentals course, then you are ready for this course.

Course Benefits

- Gain a comprehensive review of advanced active/passive IR/EO technology as needed for SOA systems design and analysis
- Develop an understanding of systems trade-off analysis in design of active/passive IR/EO systems

Course Content

Systems Concepts

- Propagation of radiation through the atmosphere
- Basic non-imaging IR/EO systems
- Detection/warning/target acquisition/tracking
- Imaging IR/EO - passive and active
- Multispectral/hyperspectral imaging
- Polarimetric imaging
- Coherent-heterodyne detection
- 3-D imaging laser radar

Characteristics of Targets and Backgrounds

- Signatures and their uses
- Spectral, spatial, temporal and polarization characteristics

Signal Processing

- Image signal processing/discrimination
- Spectral signal processing
- Spatial image signal processing
- Optimum filter design theory
- Likelihood-ratio methods
- Statistical decision theory

Detectors and Focal Plane Array Technology

- SOA and trends for advanced detectors
- Applications of FPAs - scanning vs. staring
- Military and civilian
- Remote sensing and environment

Applications

- Military and civilian
- Remote sensing of the resources and environment

Interest Group

Those involved directly in the cutting edge of IR/EO Technology will not want to miss this course. Prerequisite: Bachelor's degree in engineering, physics, or mathematics. Some knowledge of atomic, molecular and solid state physics as well as an understanding of basic geometrical optics will be assumed. Although not a prerequisite, Infrared Technology: Fundamentals and Systems Applications is an excellent and sufficient introduction to the topics covered in this course.

Instructors

Anthony LaRocca, Ph.D., Research Physicist, General Dynamics, (formerly Veridian-ERIM)

George Zissis, Ph.D., Senior Research Physicist & Director Emeritus, Infrared Information and Analysis Center, ERIM

Lauren Peterson, Ph.D., Research Physicist, General Dynamics, (formerly Veridian-ERIM), Adjunct Professor, University of Michigan

Eustace Dereniak, Ph.D., Professor, University of Arizona, Optical Sciences and Electrical and Computer Engineering, Optical Sciences Center

Rodney Anderson, Ph.D., Research Physicist and Director of IRIA Center, General Dynamics, (formerly Veridian-ERIM)

David Kryskowski, Research Engineer, Ann Arbor Sensor Systems LLC

Participants will receive a complimentary Infrared Handbook.

"Instructors were very knowledgeable, experienced, and motivated to teach the students."

"Impressed with the overwhelming knowledge of the professors in the field."

"Ability to convey both technical details as well as intuitive analysis of behavior."

Previous Participants