



The IEEE

Newsletter

PUBLICATION OF THE NORTH JERSEY SECTION OF THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

No. Jersey SMC Society:

Advanced Tutorials on Excel 7.0

On April 16, 1998, the IEEE North Jersey Systems, Man and Cybernetics Society Chapter will host the continuance of three or four (depending on interest) free tutorials and demonstrations by Mike Liechenstein on the development and usage of spreadsheets.

About the Talk

The lectures will progress in sophistication, using Excel 7.0 as a vehicle. Applications in business and personal usage will be discussed, as well as the utility of spreadsheets in data analysis, data description (including graphical presentation), and projections. Database capabilities, such as sorting and data filtering, will also be examined.

The final lecture will cover some of the built-in statistical tools for estimation and forecasting (e.g., stock market time series projections), their interpretation and underlying assumptions. The presentations are progressively sophisticated and assume some prior knowledge (e.g., completion of the two tutorials or the equivalent, plus some familiarity with the Windows 3.X, 95, or NT environments).

All Welcome!

You need not be a member of IEEE to attend and there is no charge for admission. Light refreshments will be served.

Times:

3rd Tutorial -- 7:00 PM, Thursday, April 16, 1998.

4th Tutorial -- To be announced.

Place: Clifton Public Library, 292 Piaget Ave, Clifton, NJ, (973) 772-5500 for directions or see Newsletter web page.

Information: Dr. Mike Liechenstein (973) 471-0721 (m.liechenstein@ieee.org) or Mel Lewis (914) 968-2500 ext. 2304 (m.lewis@ieee.org).

NJ Communications & Signal Processing Societies:

Signal Processing in Multimedia

On April 15, 1998, the IEEE North Jersey Signal Processing Chapter and Communications Chapter will present a talk on "Signal Processing in Multimedia." The speaker will be Ahmed Tewfik.

About the Talk

The past few years have seen an explosion in the use of digital media. Industry is making significant investments to deliver digital audio, image and video information to consumers and customers. A new infrastructure of digital audio, image and video recorders and players, on-line services and electronic commerce is rapidly being deployed. These changes, coupled with a merging of technologies and blurring of differences between several industries, have created new paradigms in almost all areas of human activity including information exchange, entertainment, education, commerce and research.

In this talk, an overview will be presented of some of the benefits that have resulted from these paradigm shifts as well as the new challenges created by the new technologies. In particular, the discussion will focus on the role of signal processing in making the promises of the new technologies a reality and in solving the problems associated with the deployment of these new technologies.

About the Speaker

Ahmed H Tewfik received his BSc degree from Cairo University in 1982, MSc, EE and ScD degrees from MIT in 1984, 1985 and 1987 respectively. Dr. Tewfik worked at Alphatech, Inc., Burlington, MA in 1987. He is currently the E.F. Johnson Professor of Electronic Communications with the department of Electrical Engineering at the University of Minnesota. He served as a consultant to MTS Systems, Inc., Eden Prairie, MN and

is a regular consultant to Rosemount, Inc., Eden Prairie, MN. His current research interests are in signal processing for multimedia (in particular watermarking, data hiding and content-based retrieval), low power multimedia communications, adaptive search and data acquisition strategies for world wide web applications, radar and dental/medical imaging and industrial measurements.

Professor Tewfik is a Fellow of the IEEE. He is currently a Distinguished Lecturer of the IEEE Signal Processing Society. He was a principal lecturer at the 1995 IEEE EMBS summer school. He was awarded the E.F. Johnson Professorship of Electronic Communications in 1993. He received a Taylor Faculty Development Award from the Taylor Foundation in 1992 and an NSF Research Initiation Award in 1990. He gave a plenary lecture at the 1994 IEEE International Conference on Acoustic Speech and Signal Processing (ICASSP'94) and an invited tutorial on wavelets at the 1994 IEEE workshop on Time-Frequency and Time-Scale Analysis. He was selected to be the first Editor-in-Chief of the IEEE Signal Processing Letters in 1993. He is a past associate editor of the IEEE Transactions on Signal Processing and was a guest editor of two special issues of that journal on wavelets and their applications.

All Welcome

All are welcome to attend. Free pre-meeting pizza and refreshments will be provided at 4:45 PM and the meeting will start 5:00 PM.

Time: 5:00 PM (pizza and refreshments start at 4:45 PM), Wednesday, April 15, 1998.

Place: NJIT, 202 ECE Center, Newark, NJ.

Information: Yun Shi (973) 596-3501 (shi@tesla.njit.edu) or Nirwan Ansari (973) 596-3670 (ang@megahertz.njit.edu).

examining the development of these standards, we can see the trend of video technologies from basic compression to high-level image understanding. To push the technologies further, joint processing of images and audio may be the next step.

About the Speaker

Tsuhuan Chen received a BS degree in Electrical Engineering from the National Taiwan University in 1987, and MS and PhD degrees in Electrical Engineering from the California Institute of Technology, Pasadena, CA, in 1990 and 1993, respectively.

From January 1993 to July 1993, he was a part-time member of technical staff at the Jet Propulsion Laboratory, Pasadena, CA. From August 1993 to October 1997, he worked in the Visual Communications Research Department, AT&T Bell Laboratories, Holmdel, NJ. Later at AT&T Labs-Research, Red Bank, NJ, he worked as a senior technical staff member and then a principle technical staff member. Since October 1997, he has been with the Electrical and Computer Engineering Department, Carnegie Mellon University, as an Associate Professor. His research interests include multimedia processing and communication, image/video coding, audio-visual interaction, and multirate signal processing.

Dr. Chen co-founded and is chairing the Multimedia Signal Processing Technical Committee of the IEEE Signal Processing Society. He also serves as Associate Editor for IEEE Transactions on Circuits and Systems for Video Technology, and for IEEE Transactions on Image Processing. Dr. Chen is a member of the IEEE Circuits and Systems Society's Technical Committees on Multimedia Systems and Applications and on Visual Signal Processing and Communication. He received the Charles Wilts Prize for outstanding independent research at the California Institute of Technology.

All Welcome

All are welcome to attend. Free pre-meeting soda and pizza will be provided at 4:45 PM and the meeting will start 5:00 PM.

Time: 5:00-6:00 PM, Wednesday, April 29, 1998.

Place: NJIT, 202 ECE Center, Newark, NJ.

Information/Reservations: Yun Shi (973) 596-3501 or shi@tesla.njit.edu.

North Jersey Section Activities April 1998

Apr. 1—"NJ Section Executive Committee Meeting" – 7:00PM, ITT, 100 Kingsland Road, Clifton, NJ. Keith Saracinello (973) 515-8829 or k.saracinello@ieee.org.

Apr. 2—"TCP Over ATM" – NJ Communications and Signal Processing Chapters, 7:15 PM (pizza and refreshments 6:45 PM), NJIT, 202 ECE Center, Newark, NJ. Hongya Ge (973) 642-4990 or Yun Shi (973) 596-3501 (shi@tesla.njit.edu). Please check <http://megahertz.njit.edu/~ieeenj/comm.html> for latest updates.

Apr. 15—"Signal Processing in Multimedia" – NJ Signal Processing and Communications Chapters, 5:00 PM (pizza and refreshments 4:45 PM), NJIT, 202 ECE Center, Newark, NJ. Yun Shi (973) 596-3501 (shi@tesla.njit.edu) or Nirwan Ansari (973) 596-3670 (ang@megahertz.njit.edu).

Apr. 16—"Advanced Tutorials on Excel 7.0 (3rd Session)" – NJ Section Systems, Man and Cybernetics Society, 7:00 PM, Clifton Memorial Library, 292 Piaget Ave, Clifton, NJ. Dr. Mike Liechenstein (973) 471-0721 (m.liechenstein@ieee.org) or Mel Lewis (914) 968-2500 ext. 2304 (m.lewis@ieee.org).

Apr. 22—"Limits - Some Are More Fundamental Than Others" – NJ EDS/C&S Chapters, 7:00 PM (Buffet 6:00 PM), NJIT, Room 202, ECE Center, Newark, NJ. Dr. Richard Snyder (973) 492-1207 (RS Microwave) or Dr. Edip Niver (973) 596-3542 (NJIT).

Apr. 29—"Recent Progress in Video Standards: H.263 Version 2, MPEG-4 and MPEG-7" – NJ Signal Processing Chapter and NJIT Department of ECE, 5:00 PM (pizza and refreshments 4:45 PM), NJIT, 202 ECE Center, Newark, NJ. Yun Shi (973) 596-3501 (shi@tesla.njit.edu).

Apr. 30—"So You Want to be a Consultant?" – NJ Consultants' Network, 7:30 PM, Bell Labs/Lucent Technologies, 67 Whippany Road, Whippany, NJ, room 3c-310 (due to remodeling at Lucent, room number may change – please check with us). Check web site at <http://www.hicom.net/~cnnn> or contact R. Walker (973) 728-0344 (r.d.walker@ieee.org)..

Upcoming Meetings

May 3—"NJ Section Awards Reception"—3:00 to 5:00 PM at the Birchwood Manor, 111 North Jefferson Road, Whippany, NJ. Anne Giedlinski (973) 377-3175.

May 4—"Provisioning Quality of Service in Next-generation ATM Switches" – NJ Communications Chapter, 5:30 PM (pizza and pop 5:00 PM), NJIT, 202 ECE Center, Newark, NJ. Hongya Ge (973) 642-4990 or Nirwan Ansari (973) 596-3670 (ang@megahertz.njit.edu). Please check <http://megahertz.njit.edu/~ieeenj/comm.html> for latest updates.

May 6—"NJ Section Executive Committee Meeting" – 7:00PM, ITT, 100 Kingsland Road, Clifton, NJ. Keith Saracinello (973) 515-8829 or k.saracinello@ieee.org.

Jun. 16-Jul. 23—"Visual Basic 5.0" – North Jersey Section, Tuesday and Thursday Evenings, 6:30-9:00PM, location to be determined. Dr. Fred Chichester (973) 744-3065 (leave message) or Art Greenberg (973) 492-1207 (for course content questions only).

Members and Non-Members Welcome

PLEASE POST

NJ EDS, C&S Chapters:

Limits - Some Are More Fundamental Than Others

The IEEE NJ Section Electron Devices, and Circuits and Systems Chapters will host a talk April 22, 1998 on "Limits - Some Are More Fundamental Than Others." The speaker will be Dr. Lewis Terman.

About the Talk

The semiconductor industry has had over three decades of spectacular technical advancement and growth, driven by the continuing progress in device miniaturization. There is now concern that fundamental limits, such as the speed of light, breakdown fields, tunneling, sub-threshold conduction, etc., will begin to materially slow down or even halt further device miniaturization, and with it profoundly change the industry. However, it is concluded that while there are many practical considerations, there appears to be no fundamental limits to device design to well below 0.1 μ m, and that even if progress in devices were to dramatically slow or stop, major improvement in system performance will continue through further optimization in such areas as design tools, circuit and chip design, and systems configuration.

About the Speaker

Lewis M. Terman received the BS, MS, and PhD degrees from Stanford University in 1956, 1958, and 1961 respectively. In 1961 he joined the IBM Research Division, working first on system logic design, and then on magnetic film memory development. In 1964 he began working on MOS memory, participating in the program which resulted in the initial IBM NMOS memory products. In the 70's he worked on MOS and CCD memory, MOS logic and MOS analog circuits. During 1979-80 he was on the Technical Planning Staff of the Director of Research. From 1981 to 1991 he directed groups doing research on circuits, devices, and technology for advanced MOS memory and logic. In 1991-1993 he was a Senior Member of the Technical Plans and Controls staff of the IBM Research Division, and he is currently a Program Manager in the VLSI Design area.

Dr. Terman is president of the IEEE Solid-State Circuits Society, and treasurer of the IEEE Technical Activities Board. He was president of the IEEE Electron Devices Society in 1990-1991, editor of the Journal of Solid-State Circuits 1974-77, chairman of the 1983 International

Solid-State Circuits Conference, and chairman/co-chairman of the Symposium on VLSI Technology and the Symposium on VLSI Circuits.

Dr. Terman is a Fellow of the IEEE and the American Association for the Advancement of Science, and was elected to the IBM Academy of Technology in 1991. He was the recipient of the 1995 IEEE Solid-State Circuits Technical Field Award, and was elected to the National Academy of Engineering in 1996.

All Welcome

You do not have to be an IEEE member to attend.

Time: 7:00 PM, Wednesday, April 22, 1998. Free buffet will be starting at 6:00 PM.

Place: NJIT, Room 202, ECE Building, Newark, NJ.

Information: Dr. Richard Snyder (973) 492-1207 (RS Microwave) or Dr. Edip Niver (973) 596-3542 (NJIT).

NJ Communications & Signal Processing Societies:

TCP Over ATM

On April 2, 1998, the IEEE North Jersey Communications and Signal Processing Chapters together with NJIT's ECE Graduate Student Club will jointly sponsor a talk on "TCP Over ATM." The speaker will be Dr. Nirwan Ansari.

About the Talk

Transmission Control Protocol (TCP) has been the predominant choice in today's Local Area Networks (LANs), and is essentially the standard in data communications. While the industry is debating over several emerging technologies in providing various looming services, it is imminent that ATM must provide backward compatibility in accommodating TCP traffic efficiently in order to be considered as a viable competitive option in the LAN arena. During the pursuit for technical and marketing supremacy among various technologies, this talk attempts to shed some light on various issues in TCP over ATM: TCP over UBR, and TCP over ABR. Performance comparison of TCP traffic running on different rate based ABR flow control is also presented.

About the Speaker

Nirwan Ansari received the BSEE (summa cum laude) from NJIT in 1982, the MSEE from the University of Michigan in 1983, and the PhD degree from Purdue University in 1988 upon which he joined

the ECE Department of NJIT, where he is a Professor and the Associate Chair for Graduate Studies.

His current research interests include broadband networks, distributed and adaptive detection in CDMA, computational intelligence, and nonlinear signal processing. He is the chair of the North Jersey Chapter of the IEEE Communications Society which received the 1996 Chapter of the Year Award. He is a Senior Member of the IEEE, a special feature editor and an associate technical editor of the IEEE Communications Magazine, and he serves in several IEEE committees. He authored with E. Hou Computational Intelligence for Optimization, 1997, and edited with B. Yuh Neural Networks in Telecommunications, 1994, both published by Kluwer Academic Publishers.

All Welcome

All are welcome to attend. Free pre-meeting pizza and refreshments will be provided at 6:45 PM.

Time: 7:15 PM, Thursday, April 2, 1998.

Place: NJIT, 202 ECE Center, Newark, NJ.

Information: Hongya Ge (973) 642-4990 or Yun Shi (973) 596-3501 (shi@tesla.njit.edu). Please check <http://megahertz.njit.edu/~ieeenj/comm.html> for latest updates.

Joining an IEEE Society for 1998 - Becoming a Society Member

An invitation to Join One or More of the 36 IEEE Societies

Now is an ideal time to maximize your IEEE membership by joining as many IEEE Societies as serve your technical needs and interests. You gain valuable technical information you might otherwise miss - through low cost special publications, conferences and technical committees, and at the local level, through meetings and activities conducted by its chapters.

Available to You

As an IEEE member, you may join as many IEEE Societies as desired. Many Society Memberships include a subscription to a technical publication. Society members may also receive a Society newsletter, conference announcements, and other information relating to available activities and products. Some Societies offer multiple publication options for which additional fees are required.

To get a Society Membership brochure, contact Don Weinstein, Kulite Semiconductor, One Willow Tree Road, Leonia, NJ 07605-2239, (201) 461-0900 ext. 234 mornings or Amy Galarowicz, Glatt Air Techniques Inc., 20 Spear Road, Ramsey, NJ 07446-1288, (201) 818-3740, FAX (201) 825-0389, e-mail: a.galarowicz@ieee.org.

Industry Liaison Committee Formed

The North Jersey Section has formed the Industry Liaison Committee (ILC) to improve the interface and responsiveness between our membership and industry. The majority of the members are in industry and the remainder are from academia. Self employed members and consultants are part of the industrial base. Retirees are presumed to be from industry or academia in the same proportions as the general membership.

There will be benefits to industry and to the general membership as the interface and responsiveness improves. The members will have the opportunity to increase their personal exposure within their companies and in the northern New Jersey industrial community and also broaden their technology base. Industry will benefit from the improved knowledge

base of its employees and will have increased exposure to the resources available from the Institute.

To help the ILC accomplish its tasks we are requesting that our membership contact the IEEE Operations Center in Piscataway at 800-678-IEEE (800-678-4333) to update their employer record.

I am also requesting that companies contact me, Joseph Nelson, at (201) 866-8219 and provide me with the name and number for a single point contact for IEEE information.

NJ Consultants' Network:

So You Want to be a Consultant?

On Thursday evening, April 30, 1998, the IEEE Consultants' Network of Northern NJ will feature a panel of seasoned engineering consultants on operating an independent engineering practice.

About the Talk

Engineers downsized or merged out from the corporate workplace are tempted to establish their own engineering consulting practice as a career option. However, like other professional choices, consulting has its own particular hazards and pitfalls.

This talk is for engineers and other technical professionals who are just starting or are contemplating striking out on their own. We'll talk about the mindset required of a consultant, review the basic principles of a consulting business, and discuss the benefits and disadvantages of an independent practice.

About the Speakers

A panel of experienced consultants from the IEEE Consultants' Network of Northern NJ will share their knowledge of the engineering consulting business, and offer hints and suggestions to those starting out.

About the Network

The Consultants' Network of Northern NJ was founded in 1992 within the North Jersey Section of IEEE. It serves as an educational and a business resource for IEEE members in independent practice. Its efforts are coordinated with other IEEE networks nationwide through the Alliance of Independent Consultants' Networks (IEEE-USA).

Time: 7:30 PM, Thursday, April 30, 1998.

Place: Bell Labs/Lucent Technologies, 67 Whippany Road, Whippany, NJ, room

3c-310. (Due to remodeling at Lucent, room number may change - please check with us).

Information: Check web site at <http://www.hicom.net/~cnnn> or contact R. Walker (973) 728-0344 (r.d.walker@ieee.org).

Student Paper Night Concluded

On Tuesday February 17, the North New Jersey Section conducted the annual student paper presentation night. It was held at the Howe Center of Stevens Institute of Technology in Hoboken, NJ.

Despite the stormy night, the event was well attended. Presentations were given by: Dario Gil on MEMS: Materials and Processes, James Bessette on The Design of the Co-Operative Education Infoserver, and Sashidar Venkatesan on Mobile Agents. Dario Gil won first place (\$100) and James Bessette won second place (\$60), both qualified to participate in the Region I Paper Contest.

Dario Gil will be attending the conference on April 18th at UMass Lowell (<http://www.uml.edu/Dept/EE/IEEE/conference.htm>) presenting his paper on MEMS.

Additional thanks go to North Jersey Section volunteers Fred Chichester, Amy Galarowicz, and Mel Lewis (Chairman) who helped judge the competition. Other attendees also filled out comment sheets which were collected and delivered to the participants. The primary goal being to help students develop their communication skills through constructive criticism.

The North Jersey Section Presentation night will be held again next year in mid to late February. Greater participation is hoped and the call for presentations will start early in December 1998. All North Jersey undergraduates who are IEEE members are eligible to participate.

In Memoriam Dr. Robert R. Sinusas, PE

Dr. Robert R. Sinusas, PE, Past Chairman of the North Jersey Section of the IEEE, died on Saturday, February 21, 1998 at the age of 62. Bob, as he was known to all of us in the Section, gave 29 years of active and dedicated service to the engineering community through his efforts with the North Jersey Section.

Dr. Sinusas was a Student Member of the Institute of Radio Engineers (IRE), the predecessor of the IEEE, in 1959. He became a Member in 1961 and a Senior Member in 1980. He became active in the North Jersey Section's Executive Committee in 1969. Bob served the Section and traveled through the Chairs as Member At Large, Secretary, Treasurer, Vice Chairman and Section Chairman in 1988 leaving his signature of enhancement on every position. He was responsible for drafting the "North Jersey Section IEEE Financial Guide" for our Section's Operation and Procedures Manual while holding the position of Treasurer in 1985.

His primary love for the profession was demonstrated by his leadership role in the area of professional activities as he chaired our Professional Activities Committee for Engineers, (PACE). His efforts here placed North Jersey first of the more than 20 Region I Sections in Professional Activities. In 1988 he was awarded the Region I Professional Leadership Award and in 1991 he received the Individual Alex Gruenwald Region I PACE award. For four consecutive years, from 1991 to 1994, the Section received the Section Alex Gruenwald Region I award of \$1000 for extensive activities in the professional arena. More Alex Gruenwald Region I awards were to follow due to the efforts of Dr. Sinusas. Bob organized and directed approximately 200 IEEE meetings on the subject of Professional Activities alone.

Dr. Sinusas graduated Eta Kappa Nu from Drexel University with a MSEE in 1963. He earned his MSME at Drexel in 1968 and later received his PhD in Mechanical Engineering from Newark College of Engineering in 1975.

Bob's work travels brought him through Waterman and General Atomics in Philadelphia to Fairchild in Clifton and then to Monsanto in Dumont and West Caldwell. In 1976 he and his family left for Algeria for an assignment with the Algerian Petroleum Institute as a Professor of Polymer Science and Engineering. They returned to the US in 1978 to another rather bleak employment picture. Bob began working as a contract engineer on assignment to Bendix for T.P. Consultants in the summer of '80 and later in 1985 became directly employed by the Bendix Corporation. Some of his work at the Bendix Guidance Division (Allied) was as a systems analyst on the systems and camera for the GALILEO Space Program. Bob suffered from a stroke while at work and retired from professional practice in 1988.

Robert and his parents, of Lithuanian decent, emigrated from Europe in 1949 and arrived in New York City on the 23rd of December to be greeted by cold weather and the warmth of New York in all of its Holiday lights, song and glory. They moved to and lived in Philadelphia. Bob is survived by his wife Ellen and two daughters Asta 22, and Ruta 19. Asta is on a one year leave from the University of Toronto where she is majoring in English and Ruta is attending Fairleigh Dickinson University and studying Computer Graphics.

Bob will be missed and long remembered by his associates and members of the Executive Committee of the North Jersey Section for his leadership, friendliness, and contributions to the IEEE and to the members of the engineering community.

IEEE AWARDS RECEPTION

*North Jersey Section
May 3, 1998
Birchwood Manor, Whippany NJ*

*A time to relax, unwind and enjoy --
A time to pay tribute to our new Fellows --
A time to honor our Award Winners --
YES it's time for the Annual Section Reception*

The Annual Section IEEE Awards Reception will be held at the Birchwood Manor, 111 North Jefferson Road, Whippany again this year. The affair is scheduled for **Sunday, May 3, 1998** from 3 to 5 PM. Tickets are \$35.00 each and include a complete prepaid, two-hour open bar, hors d'oeuvres, buffet, and dessert. Spouses and guests are welcome. We are limited to 90 attendees, so please make your reservations early.

Reservations are required by April 28, 1998. Complete the reservation form and return it with your payment. If you would like tickets mailed back to you, please enclose a self-addressed **stamped** envelope. Otherwise, your tickets will be held at the door for you. If any additional information is required concerning the reception, contact Anne Giedlinski at (973) 377-3175.

Use this form for Reception reservations. **ENCLOSE A SELF-ADDRESSED STAMPED ENVELOPE to receive tickets in advance.** **Reservations are required by April 28, 1998.**
Mail reservation request to:

Anne Giedlinski
299 Brooklake Road
Florham Park, NJ 07932

Enclosed is _____ for _____ ticket(s) at \$35.00 each (make check payable to **North Jersey Section IEEE**) for:

NAME: _____

ADDRESS: _____

IEEE North Jersey Section Seminar

on

VISUAL BASIC 5.0

Tuesday and Thursday Evenings, June 16 – July 23, 1998

Location to be Determined

The IEEE is offering an evening course entitled "Visual BASIC 5.0." This comprehensive course is intended for programmers migrating from procedural languages to "Visual BASIC." Prerequisites for the course are a familiarity with Windows 95, knowledge of a procedural language, such as BASIC or C, and programming concepts, access to Microsoft Visual BASIC as well as Microsoft Windows 95. Upon completion, students will understand event driven programming; standard control objects and their associated properties, methods and events; have the ability to design application solutions. The course will run for 6 weeks. Each session will run for 2.5 hours with a short break in the middle. A textbook with CD ROM and all text materials required will be provided.

TOPICS

1. Introduction to Visual BASIC; Naming conventions; Creating a Graphical User Interface (GUI); Properties, Events and Methods for forms, Text Boxes, Command buttons and labels; Event procedures; variable declarations; environment options; saving programs.
2. Scope; Code modules; Variables and constants; Built-in functions; Expressions and statements; Finite and dynamic arrays; Static variables; Procedures and functions; passing data by reference or value; Program flow constructs.
3. Debug tools; Properties, events and methods for lines, shapes, check boxes, option buttons, frames, picture boxes and images; Toolbar; Status bar; Z Order; Control arrays.
4. Properties; events and methods for list boxes and combo boxes.
5. Properties, events and methods for horizontal/vertical scroll bars and timers.
6. Multiple form projects; Error trapping and handling.
7. Data Manager and the Data Control; Data-aware controls; Grid control.
8. Multiple Document Interface (MDI) Forms; Menu Design.
9. Keyboard events; Dynamic Link Libraries (DLL).
10. Clipboard; Shell Function; Dynamic Data Exchange (DDE).
11. Object Linking and Embedding (OLE), OLE automation.

Class size will be limited to a maximum of 30 with a minimum of 15. Early registration is recommended. Telephone reservations will NOT be accepted. Applications postmarked after May 27th will require an additional late fee of \$25. No application will be accepted after June 3rd.

WHERE: To be determined.

WHEN: Tuesdays and Thursdays, June 16 – July 23, 1998, 6:30-9:00 PM.

COST: IEEE members \$245; Nonmembers \$360. Including text book.

CONTACT: Dr. Fred Chichester (973) 744-3065 (leave message) or Art Greenberg (973) 492-1207 (for course content questions only).

REGISTRATION: VISUAL BASIC 5.0

To: Mr. Naz Simonelli, 68 Woodmont Drive, Randolph, NJ 07869-3740

Name: _____

☐ Nonmember

☐ IEEE member Member #: _____ Member of _____ technical society

Employer: _____

Address: _____

Home Address: _____

Business (day) telephone #: _____ Home telephone #: _____

Please enclose required fee payable to: **North Jersey Section IEEE**

Registration status will be mailed after June 4, 1998. In general, the effective date of the application corresponds to the date when BOTH a fully completed application and payment are received.

☐ Tuition receipt will be mailed only if this box is checked

Signature: _____