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Conference Tutorials-An Opportunity For Continuing Education

John H. Park

William H. Tranter

Missouri University of Science and Technology

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2) It is much more difficult and time-consuming to develop a course with relevant problems and interesting scenarios than to develop a straight lecture course.

3) The classroom design is very effective and popular with both the students and instructors.

4) A one year course is too long. The two- to three-month format is greatly preferable.

5) Having the Institute faculty member act as curriculum designer and course manager, and calling on experts to give presentations in specialized subjects, has been highly successful. The technique is most effective if speakers make their presentations in the context of the problem being solved.

6) It is important to solicit feedback frequently from the students both individually and collectively and to react to it. It gives them a sense of participation and raises morale and interest.

The MITRE Institute, developing through experience and staying close to the on-the-job requirements of the working systems engineer, appears to be, if not unique, at least unusual in its goals, its scope, and its effectiveness, in a field which is both difficult to teach and difficult to learn.

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Conference Tutorials—An Opportunity for Continuing Education

JOHN H. PARK, JR., MEMBER, IEEE, AND WILLIAM H. TRANTER, MEMBER, IEEE

Abstract—The Educational Services Committee of the IEEE Communications Society has sponsored eleven tutorial short courses at its major conferences over the past six years. The experience gained in developing and presenting these tutorials is shared with others so that they may be in a better position to sponsor similar continuing education activities in the future. The conference tutorial is one example of a continuing education activity that can be sponsored by an IEEE Group or Society as a service to its members.

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J. H. Park, Jr., is with the Department of Electrical Engineering, University of Minnesota, Minneapolis, MN 55455.

W. H. Tranter is with the Department of Electrical Engineering, University of Missouri at Rolla, Rolla, MO 65401.

I. HISTORY OF THE IEEE COMMUNICATIONS SOCIETY SPONSORED TUTORIALS

THE CONSTITUTION of the IEEE Communications Society states that the objectives of the Society shall be scientific, literary, and educational in character. Shortly after the Communications Group gained its Society status, these objectives were reexamined to determine the impact of the society in each of these three areas. The scientific and literary objectives of the Society were being addressed by various meetings and conferences and by the publication of the *Transactions* and *Communication Society Magazine*. It was quickly determined that the educational objective was not

TABLE I
SUMMARY OF COM-SOC TUTORIALS

SPONSORING CONFERENCE	TITLE OF TUTORIAL	PRESENTER(S)	ATTENDANCE
ICC-72 (Philadelphia, PA)	Synchronous Communications	J. J. Stiffler R. Esposito	75
ICC-73 (Seattle, WA)	Coding Techniques for Digital Communications	James L. Massey	62
NTC-73 (Atlanta, GA)	Principals of Optical Communication	R. S. Kennedy	36
ICC-74 (Minneapolis, MN)	Communications Satellites	P. L. Bargellini	87
NTC-74 (San Diego, CA)	Computer Networks	Mischa Schwartz	64
ICC-75 (San Francisco, CA)	Coding and Modulation for Coherent, Non- coherent and Multiple-Access Channels	A. J. Viterbi	85
NTC-75 (New Orleans, LA)	Microprocessors and Their Impact on Communications	Andre Vacroux	96
ICC-76 (Philadelphia, PA)	Convolutional Coding Techniques	James L. Massey	62
NTC-76 (Dallas, TX)	Phase-Locked Loops: Design and Application	Jacob Klapper Floyd Gardner	100
ICC-77 (Chicago, IL)	Digital Switching	S. G. Pitroda	190*
NTC-77 (Los Angeles, CA)	Modulation/Coding for Bandlimited Nonlinear Satellite Channels	Pravin C. Jain	100

* Tutorial was conducted twice because of unusually high enrollment.

being properly addressed within the Society and in order to focus attention on this problem, the Educational Services Committee was formed early in 1972.

Since the organization of this committee, a tutorial short course has been offered at each of the major conferences sponsored by the Communications Society. These are the National Telecommunications Conference (NTC), which is held every year in Late Fall, and the International Conference on Communications (ICC) which is held every year in Late Spring. A listing of the tutorials which have been offered under IEEE Communications Society sponsorship is given in Table I.

The first tutorial in the series was organized in response to a request from the Philadelphia Section of IEEE to include a tutorial short course as an integral part of ICC-72. The interest shown in this activity was encouragement to offer a second tutorial short course at ICC-73 in Seattle, WA. Since that time, a tutorial short course has been offered at every NTC and ICC.

The IEEE Communications Society tutorials are six hours in length, spanning two regular conference sessions. The conferences are traditionally three days in length. We have found, by trial and error, that the ideal tutorial scheduling is to use an afternoon session of the second day and a morning session of the third day. Splitting the tutorial in this way provides a necessary break for both the lecturer and the participants, and allows people who arrive at the conference during the first day to register for the tutorial.

The organization is simple. Responsibility for the tutorial lies with the course director, who is appointed by the Educational Services Committee. He is a member of the Conference Program Committee in order to provide liaison with the conference necessary for scheduling rooms, obtaining a budget, scheduling the tutorial sessions and other sessions on related

topics and handling advertisement. The tutorial is advertised along with the conference by using the conference advance program. There are no special mailings required for the tutorial.

II. WHO TAKES THEM AND WHY?

In the planning, preparation, and presentation of a tutorial short course, one must address the question: Who is the course intended to serve? The final evaluation of the course must address the question: Who in fact took the course and what was the reaction to it? Additional questions are: Was the course a meeting of academicians exchanging new course material? Was the course a conclave of researchers learning new and possible esoteric research results? Did the course serve the purpose for which it was intended?

The Educational Services Committee of the IEEE Communications Society feels that in our rapidly changing technology, there is a need to give engineers short courses in new technologies at a basic level so that they can better appreciate the impact of these new technologies on their own work. This gives them a fundamental appreciation of the new area on which to base future work. Course emphasis is on basic understanding of the current state-of-the-art and underlying theory. Current research results are not usually the principle topic of the tutorial since they are domain of the other technical sessions. The tutorial is a complementary activity, not a competing activity, of the technical conference. Each course is selected to appeal to a broad audience, yet the course content must be kept narrow in scope so that the subject matter can be covered in some depth.

The basic measure of success in meeting these objectives is the total attendance and the participants satisfaction with the course. In almost all cases, the attendance was more than anticipated, and in *all* cases the overall reaction to the course

TABLE II
TUTORIAL ATTENDANCE BY EMPLOYER TYPE

Conference	ICC 72	ICC 74	ICC 77
Location	Philadelphia	Minneapolis	Chicago
Topic	Synchronous Communication	Satellite Communication	Digital Switching
<u>Employee</u>			
Gov't/Non-Profit Research	22%	12%	12%
Academic	19%	20%	2%
Commercial	59%	68%	86%

was favorable. The only exception was the less than anticipated attendance at the course on "Principles of Optical Communications" given at NTC 73. The reason was apparently due to the fact that the technology was too new and perhaps would have been more appropriate for a regular technical session. The same topic today would probably have much broader appeal. Tutorial registration was limited to 100 persons for all courses, and in many cases this maximum was reached. At ICC 77, where the topic was "Digital Switching," the tutorial was oversubscribed with advance registrations and a second offering of the tutorial was scheduled which was also nearly full.

Some idea of the type of people that attend these tutorials can be gained from employment statistics. Table II summarizes this data for three conferences. The conference location probably has some effect on the cross section of tutorial attendance. An important observation is that the preponderance of attendees work for commercial companies. The most popular tutorial "Digital Switching" had only 2 percent attendance from academia and 86 percent from commercial companies. The modest registration fee (\$25.00) is probably not a deterring effect on registration. Of particular interest is that very few student members of IEEE (typically 1 or 2) attend the tutorials. No statistics are available on age distribution or actual position within a company. However, visual observations at the tutorial and discussion with attendees reveals that the majority are mid-career working engineers at the mid-management level or below.

It is also interesting to observe attendance as a function of distance traveled to attend the conference. One might expect that a large portion of the attendees come from local companies or institutions. Table III indicates that this is not the case. The figures do reflect the proximity to communications industries, but it should be noted that many of the attendees traveled over 500 miles to attend the conference. This suggests that a successful conference tutorial need not be designed to satisfy the needs of local or even regional interests.

A comprehensive set of notes is printed for the tutorial and is available only to tutorial registrants. Because of the nominal fee, one might suspect that a large number of registrants may not attend the whole six hours of instruction, but rather pay the fee to obtain the notes. However, a head count of tutorial attendance reveals that 80 to 90 percent of the registrants attended *all* six hours of instruction. This suggests that the registrants are truly interested in educating themselves in the tutorial subject matter.

III. ENROLLMENT STATISTICS

As illustrated in Table IV, the tutorial enrollment averages 9 percent of the technical session conference attendance. In determining this statistic, only those who registered for all

TABLE III
TUTORIAL ATTENDANCE BY DISTANCE TRAVELED

Conference	ICC 72	ICC 74	ICC 77
Location	Philadelphia	Minneapolis	Chicago
Topic	Synchronous Communication	Satellite Communication	Digital Switching
<u>Distance Traveled</u>			
Local (<30 miles)	30%	7%	19%
Regional (30-500 miles)	34%	6%	10%
North America (>500 miles)	25%	81%	66%
Overseas	11%	6%	5%

TABLE IV
RELATIONSHIP OF TUTORIAL ATTENDANCE TO CONFERENCE REGISTRATION

Conference	Tutorial Attendance	Conference Registration*	Percentage Attending Tutorial
ICC-72	75	1,005	7.5%
ICC-73	62	1,005	6.2%
NTC-73	36	685	5.3%
ICC-74	87	957	9.1%
NTC-74	64	710	9.0%
ICC-75	85	1,209	7.0%
NTC-75	96	886	10.8%
ICC-76	62	851	7.3%
NTC-76	100	1,046	9.6%
ICC-77	190	1,146	16.6%

* Only those who registered for all three days of the conference are counted in this total.

three days of the technical conference were counted. This excluded those attending only exhibits, exhibitor personnel, spouses, and one-day attendees. In a typical conference, there are eight parallel sessions of which the tutorial is one. Thus the tutorial has considerable competition and consideration was given early in the sequence to extend the conferences one day in order to accommodate a tutorial without conflict with the regular technical sessions. In order to evaluate the probable impact of this action, two questions have been included on a questionnaire which is completed by each tutorial attendee. The questions and results were:

Would you have stayed at the conference an extra day to attend the tutorial? (This would avoid conflicts with regular technical sessions.)

225 YES 111 MAYBE 134 NO

Would you *prefer* to stay an extra day in order to avoid conflicts?

186 YES 83 DON'T CARE 193 NO

In light of the results of the second question, it was decided not to extend the length of the conference. Thus the philosophy was adopted that a conference attendee chooses among many conflicting activities and the tutorial offers the attendee a broader variety of activities to choose from. However, in recent conferences, care has been taken to ensure that tech-

nical sessions having subject matter similar to the tutorial topic do not conflict with the tutorial.

While this is an obvious consideration, it is difficult to accomplish unless the tutorial course director maintains close liaison with the conference program committee. What has not been determined is the number of those not attending the tutorial who would attend if the tutorial were held on a separate day following the conference. The plans are to offer such a tutorial in the near future as an experiment.

It has also been determined from the tutorial questionnaire that very few participants are from academic institutions. Also, 18 percent of the tutorial participants indicated that they would not have attended the conference if the tutorial had not been offered.

Other results obtained from the tutorial questionnaire indicate general acceptance of the concept. Two questions and their results are:

What is your overall opinion of the presentation?

184 EXCELLENT 198 GOOD 46 FAIR 10 POOR

How would you rate the value of the course to you?

21 VERY HIGH 194 HIGH 67 LOW 12 VERY LOW

All attendees have indicated that the tutorials should be continued. Selecting the proper level for the tutorial has not been a significant problem despite the wide range of backgrounds inherent in the attendees. However, it is very important to select presenters who are both aware of this problem and are able to adjust their presentation accordingly. In every case, the presenter has received high marks for both his overall presentation and choice of level.

The most commonly expressed dissatisfaction with the tutorial has been that, for a few tutorials, the notes were not as complete as they should have been. The Educational Services Committee is coping with this problem by establishing a format for the notes which will be consistent from conference to conference. This problem is enhanced by the fact that, since the conference tutorial is a low budget operation involving a relatively small number of people, it is not possible to publish an extensive set of notes. This is also unnecessary since, in most cases, textbooks and papers exist in the open literature to supplement the tutorial lecture.

IV. FINANCING TUTORIALS

The Communications Society tutorials are financed by a separate \$25.00 fee which is charged to each participant. The main expenditures are for the honorarium paid to the lecturer and the expenses incurred in the printing of the course notes. Any surplus is placed in the conference operating fund to cover the added costs associated with the tutorial, such as room rent, publicity, and coffee breaks. Clearly, the cost of the conference tutorial is well below the cost of most other short courses.

V. BENEFITS TO THE CONFERENCE

The conference tutorial is given as a service to the members of the profession and is justified on this point alone. However, a tutorial given in conjunction with the conference also has direct and indirect benefits to the conference itself. The primary benefit to the conference is that it strengthens the technical program and offers a wider variety of activities to the conference attendees. In addition, the presence of the tutorial on the conference program is tangible evidence that

the sponsoring group (e.g., the IEEE Communications Society) is meeting, at least in part, its objective in serving the continuing education needs of its membership.

Of lesser importance, but a direct benefit to the conference, is the increased conference registration due to those who attend the conference for the primary purpose of attending the tutorial. At ICC 77, for example, a poll was taken which indicated that almost 20 percent of the tutorial attendees indicated they would not have attended the conference except for the tutorial.

VI. DO'S AND DON'T'S OF A CONFERENCE TUTORIAL

The four essential ingredients of a successful conference tutorial are:

- 1) appropriate subject matter
- 2) a dynamic lecturer who uses visual aids effectively
- 3) well produced notes closely keyed to the lecture
- 4) a comfortable room with coffee available.

The subject matter is chosen by the course director in consultation with the Educational Services Committee and the Conference Program Committee. The subject matter is a current topic consistent with the scope and theme of the conference. At each tutorial, attendees have been asked to suggest appropriate tutorial subject matter, but because of the wide range of interests, this has not been productive. In the future, participants will be asked to choose from a shopping list of tutorial topics and suggest speakers.

The lecturer is chosen to be a person whose name is widely recognized within his area of expertise and who is known to be a dynamic and well-organized speaker. On several occasions, two lecturers have been used with success, but this represents a practical maximum. If two lecturers are used, the course director must ensure that they work together closely on course development. The lecturer should be experienced in teaching either at the university level or in short courses. Remember, the success of the tutorial depends primarily on the speaker.

Each participant in a Communications Society conference tutorial is given a set of bound course notes, approximately 120 pages in length. Ideally, the notes include approximately 50 pages of text material specifically developed for the tutorial. This should be followed by copies of all viewgraphs used by the lecturer. These provide a convenient format for taking notes. The viewgraphs should be followed by a subject bibliography and a list of suggested reading material. If a good survey paper is available, it should be included in the notes. The cover for all tutorial notes should have a consistent style to denote a continuing activity.

There are some obvious things to consider when planning and presenting a conference tutorial and other things that are not so obvious. Based on our experience, we offer the following advice to others.

A. Preliminary Planning

- 1) Select a course director who will be responsible for the ultimate choice of the speaker and topic, publishing the notes, and all details in the arrangements.
- 2) The course director should be a member of the technical program committee.
- 3) Allow sufficient lead time. Two months should be allowed for publication of the notes and the speaker should be allowed six months for their preparation. Hence, the topic and speaker should be identified eight months in advance. This will also allow for advance publicity of the tutorial.

4) Spread the tutorial over two days, even though it may be a one day tutorial. This allows the speaker to get rejuvenated and allows the participants to digest the first half of the tutorial.

5) Schedule the tutorial so that it does not conflict with technical sessions in closely related areas.

6) Limit enrollment. We have found an upper limit of 100 is reasonable. If high interest is anticipated, you may wish to schedule two sessions of the tutorial or repeat the tutorial at a future conference.

B. Preparation of the Notes

1) Again, allow sufficient lead time. The course director must be sure the speaker prepares the notes in a timely fashion. The notes *must* be available at conference time for handout to the registrants.

2) Make sure that all viewgraphs used in the presentation are in the notes.

3) The notes should include a good set of references, annotated if possible.

4) If supplemental material is distributed by the speaker during the tutorial, be sure there is enough for all registrants.

C. Arrangements

1) The room should be set up classroom style with tables and chairs.

2) Control access to the tutorial with tickets or some other device. In and out traffic is very disturbing.

3) Allow time for questions and discussions.

4) Provide for smoking and nonsmoking sections.

VII. CONCLUSIONS

The IEEE Communications Society has conducted a conference tutorial program over the past six years with good results. The attendees have been enthusiastic about the program, and it will be continued and perhaps expanded in the future. Throughout the development of this program, we have gained valuable experience which we have tried to share with the reader. It was our hope in preparing this paper to give help to those planning and presenting conference tutorials.

At the present time, we are considering a mechanism for certifying attendance at these tutorials. We also plan to give a tutorial on the day following a conference to test its feasibility. Once developed, the conference tutorial can be used later as a stand alone short course offered under the auspices of a local section. This is an activity sponsored by the Educational Activities Board (EAB) of IEEE, and communication between tutorial sponsors and the board should be maintained. As an example, the course on Phase-Locked Loops is listed as EAB-sponsored short course and we expect other tutorials to be so sponsored in the near future.