American Mathematical Society

AMS SHORT COURSE SERIES
INTRODUCTORY SURVEY LECTURES

M A N U A L

FOR SHORT COURSE ORGANIZERS AND LECTURERS

American Mathematical Society
Short Course Manual

Introduction

Each AMS Short Course consists of a coherent sequence of survey lectures and discussions on a single theme of applied mathematics, ordinarily extending over a period of two days. Held immediately preceding the Joint Mathematics Meetings in January, the Short Course lecture series is directed at mathematicians seeking professional development and continuing education.

Each theme is a specific area of applied mathematics or mathematics used in the study of a specific subject or collection of problems in one or more of the physical, biological or social sciences, technology or business.

The mathematical background of the participants in these courses is assumed to be that represented by a sound undergraduate education in mathematics, but ordinarily there is a wide range in the mathematical knowledge and sophistication of the participants.

This series of Short Courses began in the summer of 1973 and since then a Short Course has been given in conjunction with all Annual Meetings. A list of previous Short Courses and their locations is contained in Attachment A.

Purpose and nature of the Short Courses

Experience with the Short Course series has shown that participants attend for a variety of reasons: one of the most common is intellectual curiosity, apparently reflecting a growing interest in applied topics; another reason is to find new research topics or new teaching material.

Each Short Course, whether devoted to a topic selected from a branch of "applicable" mathematics or devoted to an application of wide current interest, is constructed so as to present a coherent sequence of survey lectures designed for non-specialists that lead to an indication of the "state of the art", as well as introduce mathematically challenging aspects of the topic and illustrate the applications of the mathematics involved. Organizers and speakers are advised that the mathematical background and experience of the participants vary greatly: from novice to specialist, from graduate student (or even undergraduate or high school student) to senior professor, from college (two- or four-year) teacher to researcher. Lectures should begin at a level as elementary as possible with something everyone can follow, while going to enough technical detail to enable the audience to see the whole topic in perspective and determine whether they wish to pursue the subject further. **Please refer to the October 2015 issue of the *Notices of the AMS* (page 1106) to review the announcement giving details of the 2016 Short Course [http://www.ams.org/notices/201509/rnoti-p1106.pdf]** Lecture notes are posted on the web for registered participants to preview prior to the course.

Selection of the topic

The Short Course Subcommittee selects the topic(s) and organizers and recommends them to the Secretary. The AMS Executive Director must then approve the topic and budget. The Subcommittee welcomes suggestions for possible topics from past organizers and lecturers. Although it is recommended that the Short Course topics vary from year to year, it is not uncommon for similar topics of considerable and timely interest to be repeated. (See Attachment A).

PREPARATION OF A SHORT COURSE PROGRAM

1. Organizers' responsibilities

    A. SPEAKERS:

    Course organizers are responsible for choosing and coordinating the speakers whose lectures will comprise the course program. Organizers are urged to bear in mind the 1973 AMS Council resolution encouraging organizers of sessions at AMS meetings to include women in their programs, when possible.

    The total budget for reimbursement of travel and subsistence costs for speakers and organizers is $8000. The organizers are responsible for determining how to distribute the reimbursements. The AMS can reimburse speakers and the organizer for round-trip airfare plus up to three nights' hotel rooms (the night before and the nights of the Short Course) plus meals during that period. Foreign speakers are limited to $1500 for airfare, if possible. The number of speakers is usually six, in accordance with guidelines adopted by the ECBT in 1980. Organizers are urged to keep financial constraints in mind when selecting speakers, who should be encouraged to use other sources of travel support whenever possible. The Society would be appreciative of efforts by the organizers and speakers to secure the least costly options to help reduce overall costs. Organizers and speakers are not required to register for the Joint Mathematics Meetings following the Short Course. Those registration fees will not be reimbursed by the AMS.

    During initial conversations with prospective speakers, the organizer should outline the lecturers' responsibilities.

    B. PROGRAM:

    Organizers have considerable flexibility as to format and schedule of the lectures. (The Short Course Subcommittee calls particular attention to the need for breaks between lectures.) Although the timetable and the number and length of the talks vary with each course, a typical Short Course consists of six lectures, each sixty or seventy-five minutes in length, each including an overview of ten to twenty minutes. The course may end with a panel discussion by the speakers, but the organizers are urged to arrange a clean break between the last lecture and the discussion and to organize the discussion to cover all the lectures, not merely the last one. The organizer provides connective and/or introductory material prior to each lecture, or as fitting.

    The organizer should coordinate lectures to present the course theme in a coherent, well-developed fashion, with lectures intermingled within reason, while avoiding excessive thematic overlap and benefiting from as much uniformity in notation and terminology as possible.

    C. LECTURE NOTES AND SYNOPSES:

    The organizer is responsible for coordinating the preparation of a synopsis of each lecture, and suggested reading lists, for publication in the *Notices of the AMS* with the announcement of the Short Course. **As an organizer, please stress to the speakers the importance of reviewing the** *Notices* **announcement mentioned previously**.

If appropriate, the organizer is asked to provide a formal recommendation to participants for pre-course preparation, typically a one-to-three item bibliography, for publication with the synopses and reading lists.

The organizer also ensures that each speaker prepares Lecture Notes. Speakers are required to submit them to the AMS in .pdf format. Lecture notes are posted on the web for registered participants to preview prior to the course.

D. COMMUNICATION

Organizers of Short Courses are, quite naturally, concerned that no details are overlooked and that all runs smoothly. The organizer should communicate with the lecturers on a regular basis, to ensure that any problems that may arise are handled quickly and to reinforce the importance of complying with the appropriate deadlines, especially with regard to supplying the material to be printed (synopses and reading lists, and lecture notes). The AMS staff is closely involved with the collection of synopses and lecture notes, and has occasionally found it necessary to enlist the organizer's assistance in obtaining needed materials and information in a timely manner.

E. PROCEEDINGS

It is anticipated that a proceedings volume based on the lectures given at the Short Course will be published in the *Proceedings of Symposia in Applied Mathematics* (PSAPM) series of the AMS. Speakers will be required to submit their final manuscripts to the organizer(s). Detailed information, including manuscript preparation and deadlines, will be provided by the AMS Acquisitions Department at least two months before the Short Course.

The PSAPM Editorial Committee strongly recommends publication of the proceedings within eighteen (18) months after the Short Course.

The organizer's final responsibility is to serve as editor of the proceedings volume, and in this capacity, to edit the lecture notes and prepare them for publication in the AMS Book Series *Proceedings of Symposia in Applied Mathematics*. All final manuscripts need to be sent to outside referees and copies of the referee reports as well as the manuscripts will be required by the PSAPM Editorial Committee as part of the approval process for the volume.

2.   Formal Invitations to Speakers

After approval, a draft of the proposed invitation letter is sent to the organizer for review before formal invitations are issued by the AMS staff. The letter ordinarily contains:

- information on time and place of the Short Course sessions;

- tentative program schedule of lectures;

- a request for synopses and reading lists, with a deadline for publication in the *Notices*;

- a request for Lecture Notes (to be posted on the web before the Short Course for pre-registrants), with information on deadlines;

- copy of the AMS policy on travel and subsistence reimbursement;

- information about audio-visual equipment and other supplies available for use by the lecturers.

The inclusion of this information in the letter of invitation is intended to give formal status to the arrangements and to place in writing the Society's understanding of the terms of its commitments.

3. Deadlines for Speakers

Information on deadlines for material requested from lecturers will be sent to speakers with the formal invitation letter. (Overall timetables for Short Course programs are outlined in Attachment B.) Periodic reminders of impending deadlines will be sent to speakers from the AMS staff.

A particularly crucial deadline is the date by which Lecture Notes are required from lecturers: speakers must get their lecture notes to Providence by the deadline given in their invitation letter (usually two months prior to the Short Course), to allow for posting on the web in a timely manner for pre-registrants to review.

4. AMS Staff Assistance

Members of the AMS staff provide assistance in all phases of the Short Course: writing the proposal and budget approval (from material provided by the organizer), issuing formal invitations to speakers, blocking the Short Course schedule with the Meetings staff, assisting the organizer in the advance planning (scheduling of talks and preparation of announcements), collection of material from speakers (synopses, reading lists, and lecture notes), arranging for announcements in the *Notices* and other promotional releases, reproduction and mailing of lecture notes to preregistrants before the Short Course, alerting the organizer to potential problems, providing expense vouchers, and making provisions for audio-visual equipment requested. Staff members also take care of Short Course registration at the meeting and "housekeeping" chores to ensure the smooth progress of the lectures, and final cleanup details afterwards.

5. Announcements and Promotion

Because of long lead times for publications, it is necessary to prepare news releases as early as possible. Calendar announcements are inserted in *Notices of the AMS* and other publications suggested by the organizer.

A detailed announcement and program of the Short Course appears in the *Notices*, accompanying the announcement of the meeting in conjunction with which it is to be held, as well as in the final program of the meeting.   A draft of the announcement is prepared by Providence staff and sent to the organizer with a request to supply information for inclusion about the content of the course, the mathematical topics involved, and any specific background information that participants should bring to the course. At this time the schedule and order of speakers are usually settled.

THEMATIC PREPARATION OF LECTURES

Lecturers are reminded that the expected audience comes with diverse backgrounds, depth and breadth of knowledge. The targeted audience consists of a few different types:

1. the idly curious, knowing little or nothing specific of the field beyond a "layman's" or graduate student's familiarity;

2. peripheralists, who have read a few articles, perhaps "dabbled" once or twice in the field, and would like to have a perspective of the field presented on a silver platter;

3. young specialists and prospective teachers, who want to make sure they see the forest for the trees, and haven't missed something significant.

Lecturers are asked to prepare their lectures with this diversity of the audience in mind. Specifically, lecturers are asked to attend to the following:

1. All terms should be defined;

2. Avoid using "sexist wording", using gender neutral wording where necessary;

3. Lectures should start at a very elementary level (an *American Mathematical Monthly* expository article is a good paradigm);

4. Lectures should move swiftly to the "gems" of the field, avoiding the temptation to linger at points of interest only to specialists;

5. A simple example or a well-conceived set of examples should be carried through the lecture to illustrate the main ideas, as often it is only such an example which the participant retains after the lecture;

6. A brief history which led up to each topic is strongly encouraged;

7. Key bibliographic references should be included;

8. A statement of some open problems, when appropriate, should be included.

PRESENTATION OF LECTURES

While definitions and key elementary results may be consolidated into a proper subset of the lecture notes, each lecture itself should start at an elementary level and review all definitions and key elementary results used in that lecture.

During the spoken presentations lecturers are asked to be particularly sensitive to participant "overload" and "burnout" which result from lectures that move too fast or contain too many details.

AUDIO VISUAL EQUIPMENT

Laptop presentations are highly recommended. A computer projector (lcd/video projector) for laptop presentations will be provided. Speakers are required to bring their own laptops and any adapters needed to connect to the projector.

LIST OF ATTACHMENTS

Previous Short Courses   Attachment A

Deadlines   Attachment B

Attachment A:

American Mathematical Society Short Course Series

AMS MEETING	DATE	TOPIC	ORGANIZERS
Missoula, MT	Aug-73	Computing	J.T. Schwartz
San Franciso, CA	Jan-74	Computing	J.T. Schwartz
Washington, DC	Jan-75	Operations Research	A.J. Goldman
Kalamazoo, MI	Aug-75	Applied Combinatorics	D.R. Fulkerson
San Antonio, TX	Jan-76	Energy Production and Distribution	P.D. Lax
New York, NY	Apr-76	Computing	S. Winograd
Toronto, Canada	Aug-76	Mathematical Economics	G. Debreu and H.F. Sonnenschein
St. Louis, MO	Jan-77	Statistics	E. Parzen
Seattle, WA	Aug-77	Applied Combinatorics	R.L. Graham
Atlanta, GA	Jan-78	Numerical Analysis	G. Golub and J. Oliger
Providence, RI	Aug-78	Systems and Control Theory	W.H. Fleming
Biloxi, MS	Jan-79	Game Theory	W.F. Lucas
Duluth, MN	Aug-79	Operations Research	S.I. Gass and R. Disney
San Antonio, TX	Jan-80	Statistics	R.V. Hogg
Ann Arbor, MI	Aug-80	Computer Algebra	D.Y.Y. Yun
San Francisco, CA	Jan-81	Cryptology	R. Lipton
Pittsburgh, PA	Aug-81	Networks	S. Burr
Cincinnati, OH	Jan-82	Tomography	L. Shepp
Toronto, Canada	Aug-82	Statistical Data Analysis	R. Gnanadesikan
Denver, CO	Jan-83	Computer Communications	B. Gopinath
Albany, NY	Aug-83	Population Biology	S. Levin
Louisville, KY	Jan-84	Mathematics of Information Processing	M. Anshel and W. Gewirtz
Eugene, OR	Aug-84	Environmental and Natural Resource Mathematics	R. McKelvey
Anaheim, CA	Jan-85	Fair Allocation	H.P. Young
Laramie, WY	Aug-85	Actuarial Mathematics	J.C. Hickman, R. McKelvey, and E. Shiu
New Orleans, LA	Jan-86	Approximation Theory	C. de Boor
San Antonio, TX	Jan-87	Moments in Mathematics	H.J. Landau
Atlanta, GA	Jan-88	Computational Complexity	J. Hartmanis
Providence, RI	Aug-88	Chaos and Fractals	R. Devaney and L. Keen
Phoenix, AZ	Jan-89	Matrix Theory & Applications	C.R. Johnson
Boulder, CO	Aug-89	Cryptology & Computational Number Theory	C. Pomerance
Louisville, KY	Jan-90	Mathematical Questions in Robotics	R. Brockett
Columbus, OH	Aug-90	Combinatorial Games	R.K. Guy

San Francisco, CA	Jan-91	Probabilistic Combinatorics and its Applications	B. Bollobas
Orono, ME	Aug-91	The Unreasonable Effectiveness of Number Theory	S.A. Burr
Baltimore, MD	Jan-92	New Scientific Applications of Geometry and Topology	D. Sumners
San Antonio, TX	Jan-93	Wavelets and Applications	I. Daubechies
Cincinnati, OH	Jan-94	Complex Dynamics: The mathematics behind the Mandelbrot & Julia Sets	R. Devaney and L. Keen
San Francisco, CA	Jan-95	Coding Theory	A. Calderbank
		Knots and Physics	L. Kauffman
Orlando, FL	Jan-96	Artificial Intelligence	F. Hoffman
San Diego, CA	Jan-97	Applications of Computational Algebraic Geometry	D. Cox and B. Sturmfels
		Mathematical Finance	D. Heath and G. Swindle
Baltimore, MD	Jan-98	Singular Perturbations	R. O'Malley and J. Scanlon
San Antonio, TX	Jan-99	Non-Linear Control	K. Grasse and H. Sussman
Washington, D.C.	Jan-00	Quantum Computation Environmental Mathematics	S. Lomonaco and V. Manoranjan
New Orleans, LA	Jan-01	Mathematical Biology	J. Sneyd
San Diego, CA	Jan-02	Symbolic Dynamics	S. Williams
Baltimore, MD	Jan-03	Public-Key Cryptography	D. Lieman
Phoenix, AZ	Jan-04	Trends in Optimization	S. Hosten, J. Lee, and R. Thomas
Atlanta, GA	Jan-05	The Radon Transform and Applications to Inverse Problems	G. Olafson and T. Quinto
San Antonio, TX	Jan-06	Modeling And Simulation of Biological Networks	R. Laubenbacher
New Orleans, LA	Jan-07	Aspects of Statistical Learning	C. Rudin and M. Dudik
San Diego, CA	Jan-08	Applications of Knot Theory	D. Buck and E. Flappan
Washington, D.C.	Jan-09	Quantum Computation	S. Lomonaco
San Francisco, CA	Jan-10	Markov Chains and Mixing Times	D. Levin, Y. Peres, and E. Wilmer
New Orleans, LA	Jan-11	Evolutionary Game Dynamics and Computational Topology	A. Zomorodian and K. Sigmund
Boston, MA	Jan-12	Random Fields and Random Geometry	R. Adler
		Computing with Elliptic Curves using Sage	W. Stein
San Diego, CA	Jan-13	Random Matrices	V. Vu
Baltimore, MD	Jan-14	Geometry and Topology in Statistical Inference	S. Mukherjee
San Antonio, TX	Jan-15	Finite Frame Theory: A Complete Introduction to Overcompleteness	K. Okoudjou
Seattle, WA	Jan-16	Rigorous Numerics in Dynamics	J-P. Lessard and J. Bouwe van den Berg

Attachment B: Timetable for Preparation of Short Courses

1. SUBCOMMITTEE:	Recruitment of possible organizers and proposals	fall (-17 to -14 months)
2. ORGANIZER:	Preparation of tentative program, suggestions for draft proposal, informal approach to speakers	Oct-November (-14 months)
3. CHAIR:	Submission of draft proposal(s) to AMS for subcommittee meeting agenda	December 1 (-13 months)
4. CHAIR:	Presentation of draft proposal to subcommittee and subsequent request for approval	January (-1 year)
5. CHAIR:	Deadline for receipt (by AMS) of final proposal (Budget prepared by AMS staff)	February 15 (-11 months)
6. SECRETARY:	Letter sent notifying organizer	March (-10 months)
7. AMS STAFF	Formal invitations and manuals sent to speakers: Includes sample notes & Publications info	May (-8months)
8. SPEAKERS:	Deadline for receipt (by AMS) of synopses and and reading lists	July 1 (October Notices)
9. ORGANIZER:	Deadline for receipt (by AMS) of text for Notices announcement	July 1 (October Notices)
10. SPEAKERS:	Deadline for receipt of lecture notes (to AMS) in .pdf format and special Audio/Visual requests	November 1