

Announcing the Advanced Study Program in Machinery Noise and Diagnostics



As part of the fifteen week Fall term Advanced Study Program at the MIT Center for Advanced Engineering Study, we offer a program concerned with Machinery Noise and Diagnostics.

Machinery noise is of concern to manufacturers of consumer products because of the influence of noise on product acceptability. Industrial machine noise can cause problems for manufacturers because of worker safety and possible hearing damage.

Machinery diagnostics becomes more important to industry as we seek to build manufacturing machines that can monitor their own performance and test the operating condition of products being manufactured. Vibration and acoustical signals are of special value for such monitoring and diagnostic activities. Participants selected for the Machinery Noise and Diagnostics Program will participate in the design and development of a diagnostic system for a particular manufacturing process. They will receive academic instruction, attend seminars and conferences, and carry out laboratory work with the object of developing a prototype diagnostic system.

The program will consist of:

A. Machinery Noise and Diagnostics—Participants will take this course, taught by Professor Richard H. Lyon. The text is Professor Lyon's new book—*Machinery Noise and Diagnostics*. The course consists of basic information on the generation of sounds and vibration by mechanisms such as imbalance, impact, gears, and flow. The transmission of these vibrations through machine structure is studied in terms of its effect on fault signatures. The interception and interpretation of these signals is presented using concepts of analog and digital signal processing. Liberal use is made of classroom demonstrations throughout the course. Professor Lyon teaches in the Department of Mechanical Engineering and has taught this course in one and two week and semester formats at MIT, in Greece, in Australia and in China.

B. The project will be the actual development of a prototype diagnostic system. The work will be carried out in the MIT Machine Dynamics Laboratory under Professor Lyon's direction. The participants will form a team, with each member taking responsibility for separate phases of the effort. Participants will have the opportunity of selecting that phase of the effort of greatest interest to their organizations. Typical tasks will be:

1. Mechanisms analysis—forces, time sequences, motions
2. Fault simulation and signature definition
3. Sensor and analog instrumentation
4. Digital signal processing and signature recovery

The results of the project will be available for the participants to take back to their organization for further applications and development.

C. Participants in the Program will meet weekly as a group with Professor Lyon and graduate students engaged in diagnostics research to review project progress and plan future efforts. In addition, participants may attend weekly meetings of the Machine Dynamics Seminar in which faculty and student laboratory members discuss the results of their research in various areas of machinery noise, dynamics, acoustics, and vibrations.

D. Self study is available using videotaped lectures, study guides, and texts. The Center has a library of courses for participants to use. Courses that may interest participants include:

Digital Signal Processing
Digital Electronics
Probability and Statistics

Date: Machinery Noise and Diagnostics begins September 12 and ends December 15, 1988.

Fee: The fee for the program is \$9,850.

Participants are provided study offices, computer facilities and a private lounge. In addition, the libraries, classrooms, athletic and other facilities at MIT are available for use. The Center will also help in the adjustment to MIT and with other non-academic concerns.

Questions? Please write or call:

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