THE LOWELL INSTITUTE SCHOOL
under the auspices of the
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY
77 MASS AVE. CAMBRIDGE 39 MASSACHUSETTS
GENERAL BULLETIN - 1968 - 1969
AND REQUIREMENTS FOR ADMISSION

RALPH LOWELL
trustee
F. LEROY FOSTER
director
The Lowell Institute School

Established – 1903

The Trustee of the Lowell Institute has established, under the auspices of the Massachusetts Institute of Technology, an Evening School, for persons employed in the Boston area.

Courses of Instruction

For the school year commencing in September 1968, two courses of instruction will be offered – Mechanical Course and Electrical Course. Each course extends over two years and leads to a certificate granted upon graduation.

The programs of study are designed to provide a systematic study of applied science to young people employed in industrial pursuits who desire to fit themselves for higher positions. They provide excellent preparatory courses for those who may plan later to attend college.

It is the aim of the courses offered to include the study of those principles with which the students are not likely to become familiar in practice, and which will give the students a fundamental training in those matters, which will be of the greatest value to them in the work in which they are engaged.

Text-books are used in most of the subjects, but in some of the work, where the instruction differs widely from available books, printed notes are supplied to the students at cost. Students are expected to purchase such text-books, note-books, instruments, and other material as may be required throughout the courses.

The scholarship of the students and their ability to continue the courses are determined in part by examinations, but much weight is given to the term's work. Those students who fail to keep up with the work or to profit sufficiently by the instruction will be requested to withdraw from the school.
Tuition and Fees

The registration fee of five dollars per semester is required for admittance to the classes. There is no charge for tuition.

Cost for Books and Supplies

Books and supplies for the first-year cost approximately twenty-five dollars. For the second-year the cost depends upon the course selected and will fall within the limits of fifteen to forty dollars.

Requirements for Admission

To be admitted to the first-year program the applicant should be at least eighteen years of age and must pass an entrance examination in Algebra and Trigonometry. This material is usually covered in the high school curriculum. Persons with proper training may be admitted with advanced standing. Applicants seeking advanced standing are requested to submit a transcript of their previous record with their application.

The courses are open to those only who are ambitious and willing to study, and who purpose to complete the full course of two years. Admittance to separate subjects is not generally given. The character and amount of the instruction is such that, if the student is not well fitted to take up the work of the school, it will not be possible for him to derive full benefit from the Lowell Course.

All persons intending to take the entrance examination should file applications with the Director before September 1, 1968, if possible.

Faculty

RAYMOND D. DOUGLASS, Ph.D., Sc.D.
Associate Professor of Mathematics, Emeritus, M.I.T.
Lecturer in Mathematics, Emeritus

AUGUST L. HESSELSEKHWERDT, Jr., S.M.
Assistant Professor of Mechanical Engineering, M.I.T.
Lecturer in Thermodynamics and Engineering Laboratory

PAUL J. MURPHY, S.M.
Assistant Professor, Lowell Technological Institute; Consultant, NASA Electronics Research Center
Lecturer in Electrical and Electronic Circuit Theory

ARNOLD P. WEINER, S.B.
Senior Engineer, Jackson and Moreland, Inc.
A. L. Townsend Lecturer in Machine Design

MARTIN G. HUBWITZ, S.M.
Mathematician, Optics Laboratory, NASA Electronics Research Center
Lecturer in Mathematics

KENNETH W. BILLMAN, Ph.D.
Physicist, Optics Laboratory, NASA Electronics Research Center
Lecturer in Physics

IGOR PAUL, Sc.D.
Assistant Professor of Mechanical Engineering, M.I.T.
Lecturer in Applied Mechanics and Dynamics

JOHN S. MAULBETSCHE, Sc.D.
Assistant Professor of Mechanical Engineering, M.I.T.
Instructor in Engineering Laboratory

JOHN J. DONOVAN, Ph.D.
Assistant Professor of Electrical Engineering, M.I.T.
Lecturer in Computer Programming

CARLTON E. SPECK, S.M.
Instructor in Electrical Engineering, M.I.T.
Instructor in Electrical Measurements Laboratory

JOSEPH W. ALSEP, II, S.B.
Research Assistant in Electrical Engineering, M.I.T.
Lecturer in Programming
CALENDAR FOR 1968—1969

First Semester

1968

September 9   Entrance examination
September 19  Registration
September 20  Classes begin
December 20  Final classes before Christmas recess

1969

January 3   Classes begin following Christmas recess
January 15  Final classes — first semester
January 17-20  Final examinations

Second Semester

January 27  Registration, classes begin
May 9   Final classes — second semester
May 12-14  Final examinations
May 22  Graduation

No classes will be held on November 11, November 29, February 17, April 21.

All classes are held at the Massachusetts Institute of Technology. In general, the starting time is 7:00 P.M. Attendance for three or four evenings per week is required in addition to outside study.

Description of Courses

First-Year Mechanical and Electrical Courses

MATHEMATICS I (First Semester)


3 hours per week for 15 weeks. 3 semester hours.

MATHEMATICS II (Second Semester)


3 hours per week for 15 weeks. 3 semester hours.

PHYSICS I — MECHANICS (First Semester)

Introduction to the study of force, motion, and related concepts: work, kinetics and potential energy, impulse, momentum, and angular momentum.

3 hours per week for 15 weeks. 3 semester hours.

PHYSICS II — HEAT AND ELECTRICITY (Second Semester)

Introduction to the concepts of temperature, heat, and equilibrium. Thermal behavior to real and ideal substances. First and second laws of thermodynamics.

Study of the laws describing the interactions between electrical charges and currents and the interpretation of these laws in terms of the concepts of electric and magnetic fields. Behavior of capacitors, inductors, and resistors in simple circuits.

3 hours per week for 15 weeks. 3 semester hours.
Second Year Electrical Course

ELECTRICAL CIRCUIT THEORY (First Semester)


4 hours per week for 15 weeks. 4 semester hours.

ELECTRONIC CIRCUIT THEORY (Second Semester)

Physics of semiconductor and vacuum tube devices. Circuit models containing diodes and dependent generators. Graphical and equivalent circuit analysis of vacuum tube and transistor circuits. Multi-stage amplifiers, feedback, and oscillators.

4 hours per week for 15 weeks. 4 semester hours.

ELECTRICAL MEASUREMENTS LABORATORY I
(First Semester)

Experiments pertaining to electrical network theory and basic measurement techniques. Topics include the cathode ray oscilloscope, meter construction, bridges, diode networks, and the measurement of complex waveforms. Laboratory reports are required.

15 – 2½ hour sessions. 2 semester hours.

ELECTRICAL MEASUREMENTS LABORATORY II
(Second Semester)

Experiments dealing with electronic circuits. Topics include basic vacuum tube and transistor amplifiers, feedback amplifiers, relaxation oscillators, and circuits for the performance of logical operations. Most of the exercises require outside reports; some of the reports are prepared during the laboratory session.

15 – 2½ hour sessions. 2 semester hours.

Second Year Mechanical Course

THERMODYNAMICS (First Semester)

First law of thermodynamics. Energy. Properties of liquids, vapors and gases. Second law of thermodynamics. The temperature scale and entropy. Applications to closed systems and to fluids in steady flow, including air compressors, nozzles and orifices, steam turbines and engines, internal combustion engines, gas turbine cycles, vapor cycles and refrigerating cycles.

3 hours per week for 15 weeks. 3 semester hours.

APPLIED MECHANICS AND DYNAMICS (First Semester)

Statics and Strength of Materials. The physical properties of materials, simple stress under fluid pressure, riveted connections, common theory of bending, including shear and bending moment, the distribution of normal and shearing stresses. Equation of the elastic curve and the determination of slopes and deflections. Theory of strength of columns. Torsion in circular bars. Analysis of the kinematic constraints in mechanisms, including velocity and acceleration polygons. Dynamic analysis of planar motion of rigid bodies. First and second order systems. Work is based on the first-year physics course.

3 hours per week for 15 weeks. 3 semester hours.

MACHINE DESIGN (Second Semester)

Covers such fundamentals of machine design as stresses and deflections in machine parts; materials and their properties; principles of machine design: minimum cost design, specifications, selection and arrangement of parts and design factors. Includes design and selection of such machine elements as screws, fasteners and joints; mechanical springs; bearings; gears; clutches; brakes and couplings; belts and miscellaneous machine elements.

4 hours per week for 15 weeks. 4 semester hours.

ENGINEERING LABORATORY (Second Semester)

The purpose of this subject is to provide experimental work involving the principles of fluid mechanics, thermodynamics, and heat-power. The technique of report writing is followed by a presentation of the basic concepts of fluid mechanics and their relation to thermodynamics and heat-power. In the laboratory the student develops the technique of experimental observation and the test program involves the orifice, centrifugal pump, pitot tube, centrifugal fan, boiler, temperature and pressure measurement, air compressor, turbine-pump, and refrigeration system.

18 – 2 hour sessions. 2 semester hours.
Entrance Examination

The examination for admission will be held Monday, September 9, at the Massachusetts Institute of Technology. Entrance to the Institute buildings for these examinations is at 77 Massachusetts Ave., Cambridge.

September 9, 1968

6:45 P.M. to 7:00 P.M.  Registration of Applicants
7:00 P.M. to 10:00 P.M. Examination in Algebra and Trigonometry

Description of Entrance Examination on page 9

All inquiries should be addressed to Dr. F. Leroy Foster, Director, The Lowell Institute School, Massachusetts Institute of Technology, Cambridge, Mass. 02139. Telephone: 864-6900, extension 4895.

Supplementary Courses

For students who desire to carry further their study in some particular line, or for those who desire to specialize, supplementary courses are offered from time to time.

These courses are open to graduates of the school and to graduates of other institutions who have the proper qualifications. The courses, when offered, are announced in a special circular.

Subjects for Examination

The detailed requirements in the subjects set for the examination for admission are as follows:

ALGEBRA

Addition and subtraction of algebraic quantities or expressions; use of parentheses; solution of equations in one unknown; multiplication and division of algebraic quantities or expressions; law of exponents; factoring; fractions; simultaneous equations in two or more unknowns; solution of problems involving two or more unknowns; solution of quadratic equations; graphs of the first and second degree equations; arithmetic and geometric progressions; binomial expansion.

TRIGONOMETRY

The trigonometric functions of angles of any magnitude and expression of any one in terms of any other one. Functions of 0°, 30°, 45°, 60°, 90° and of angles differing from these by multiples of 90°. Determination, by means of diagrams, of such functions as \( \sin A + 90° \) and \( A - 90° \) in terms of trigonometric functions of the angle \( A \). Circular measure of angles. Proofs of the fundamental formulae such as \( \sin^2 A + \cos^2 A = 1 \), \( \sin (A + B) \), \( \sin (A - B) \), \( \sin 2A \) and \( \sin \frac{A}{2} \). Simple identities. Solution of simple equations. Logarithms and their use. Solution of right triangles using both the natural trigonometric functions and their logarithms with special reference to the applications. The Law of Sines and the Law of Cosines and their application to the solution of triangles.