VERIFIED UNCLASSIFIED

Mark M Jones 1/31/85

SECRET

MMJ 1/31/85

September 17, 1945

TO: ALL TECHNICAL PERSONNEL

SUBJECT: CATALOG OF COURSES

REGISTRATION

PLEASE NOTE CHANGED HOURS AND LOCATIONS. Registration will be held from Tuesday, September 18 to Friday, September 21 inclusive. The hours will be from 8:30 to 11:30 a.m. and from 2:30 to 5:30 p.m. in Room E-210. There will also be registration facilities in the High School from 7:00 to 9:00 p.m. in order to make registration possible for persons not employed in the Tech Area.

COURSES

UNDERGRADUATE - JUNIOR-SENIOR LEVEL

CHEMISTRY

11. Elementary Organic Chemistry.

Lecturer: M. F. Roy

Hours: Section I. Tues. & Fri. 10:30 - 11:45 a.m. Sigma 47
Section II. Mon. 7:15 - 8:30 p.m. Gamma 49
Thurs. 8:45 - 10:00 p.m. Gamma 49

Prerequisite: Elementary Chemistry

Textbook: None

Description of Course: Study of the major general classes of organic compounds, their properties, reactions, and uses.

12. Elementary Physical Chemistry.

Lecturer: I. B. Johns

Hours: Wed. & Fri. 4:15 - 5:30 p.m. in Gamma 49

Prerequisites: Elementary Chemistry Calculus; Elementary Physics desirable.

Textbook: Getman-Daniels "Outlines of Theoretical Chemistry". (Required. Price $3.50)

Description of Course: This course will give the student a working knowledge of the fundamental principles of physical chemistry, including the study of gases, liquids, solids, the principles of thermodynamics, the theory of solutions, thermochemistry and its applications, the treatment of equilibria - both homogeneous and heterogeneous, chemical kinetics, electrolytic theory.

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13. Advanced Physical Chemistry

Unfortunately, it has been impossible to secure a lecturer for this course. It will, therefore, not be given.

METALLURGY

21. Physical Metallurgy

Lecturer: George L. Kehl

Hours: 10:30 - 11:45 a.m. Mon. & Wed. in Sigma 47
Prerequisites: Elem.Chem., one semester of Elem. Physics
Textbooks: (Recommended)
"The Alloying Elements in Steel" - E.C.Bain
"Engineering Physical Metallurgy" - R.H.Heyer
"Principles of Physical Metallurgy" - F.L.Coonan
"Principles of Physical Metallurgy" - G.E.Doan & B. Mahla
"The Science of Metals" - Z.Jeffries & R.S.Archer
"Principles of Metallography" - R.O.Homerberg & R.S.Williams
"Structure and Properties of Alloys" - R.M.Brick & A. Phillips

Description of Course: State of Aggregation; origin of metallic structures; crystal structure; equilibrium diagrams of metallic systems and their interpretation; non-equilibrium conditions in metallic systems; plastic deformation and annealing; non-ferrous metals and alloys; iron and steel; basic concepts of the heat treatment of steel.

PHYSICS

31. Electricity and Magnetism

Lecturer: R. Brode

Hours: Mon. & Wed. 10:30 - 11:45 a.m. in Gamma 49

Prequisites: Sophomore Physics, Calculus

Textbook: Probably Page & Adams 2

Description of Course: Detailed discussion of the properties of electrostatic and magnetostatic fields. Electric currents and their magnetic fields, alternating currents. inductance and capacitance, oscillating circuits electric waves.

32. Modern Physics

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Lecturers: B. Rossi and L. Parratt

Hours: Section I: Wed. & Fri. 9:00 - 10:15 a.m. Rm.B-223
Section II: Mon. 8:45 - 10:00 p.m. Rm. B-223
Thurs. 7:15 - 8:30 p.m. Rm. B-223

Prerequisites: Freshman & Sophomore Physics, Calculus. A course in Electricity & Magnetism is desirable.
Textbook: "Introduction to Modern Physics"-Richmeyer & Kennard 6
Description of Course: The experimental and theoretical development which leads to the present concept of the constitution of matter. Beginning with the discovery of the electron, the course will discuss various methods of determining Avogadro's number, the structure of atoms, the atomic nucleus and cosmic radiation.

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33. Electronics

Lecturer: D.K. Froman and Elmore

Hours: Section I: Tues & Fri. 10:30 - 11:45 a.m. Gamma 49
Section II: Mon. 7:15 - 8:30 p.m. Rm.B-223
Thurs. 8:45 - 10:00 p.m. Rm. B-223

Prerequisites: Differential & Integral Calculus. General College Physics. A course in Electricity and Magnetism (Physics) or a course in Alternating Currents (Engineering)

Textbook: Reich "Theory and Applications of Electron Tubes" (Recommended.) 6

Description of Course: Electric Circuits: fundamental laws and their application to complex circuits for D.C., sinusoidal A.C., and transient currents. Electron Tubes: parts and their functions; static and dynamic characteristics and their measurement; special tubes; some basic circuits. Electronic Circuits Design: detailed parts specification; applications to simple but complete electronics circuits. Basic Electronic Circuit Elements and Complete Circuits: emphasis on circuits for industrial control and scientific measurements rather than on radio, television, and radar.

34. Micro-Waves

Unfortunately the offering of this course at the present time seems to present insuperable difficulties generally connected with the confidential character of some of the information. It is hoped to give this course in the following semester if the courses are continued at that time.

MATHEMATICS

41. Differential Calculus

Lecturer: P. Whitman

Hours: Wed. & Fri. 8:30 - 10:15 a.m. Gamma 49

Prerequisites: Analytic Geometry; Trigonometry.

Textbook: Granville, Smith & Longley "Elements of the Differential & Integral Calculus" (Required) 6

Description of Course: Differentiation of algebraic and transcendental functions; applications to slopes, maxima and minima rates, etc.; higher derivatives; differentials and applications to small errors, etc.; integration of standard elementary forms and application to simple areas, only if four hour course.

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42. Differential Equations

Lecturer: J. W. Calkin & D. A. Flanders

Hours: Section I: Tues & Thurs. 9:00 - 10:15 a.m.Gamma 49
Section II:Wed & Fri. 7:45 - 9:00 p.m. Gamma 49

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42. Differential Equations

Lecturer: J. W. Calkin

Hours: Section I: Tues & Thurs 9:00 - 10:15 a.m. Gamma 49
Section II: Wed & Fri. 7:45 - 9:00 p.m. Gamma 49

Prerequisites: One year of calculus

Textbook: "Differential Equations"-H.T H Piaggio (Required.) 6

Description of Course: Ordinary differenti l equations of the first order linear equations miscellaneous special equations existence theorems numerical methods of solution. solution in series selected topics in partial differential equations.

GRADUATE

CHEMISTRY

61. Thermodynamics

Lecturer: G. B. Kistiakowsky and E. R. Van Artsdalen

Hours: Section I: Wed. & Fri. 9:00 - 10:15 a.m. Sigma 47
Section II: Mon 8:45 - 10:00 p.m. Gamma 49
Thurs 7:15 - 8:30 p.m. Gamma 49

Prerequisites: 1 yr. college calculus; 1 yr. college Physics and the elementary chemistry up to and including 1 yr. in Physical Chemistry

Textbook: "Thermodynamics" - Steiner. (Recommended) 6

Description of Course: This is a course in chemical thermodynamics and because of time limitations it will not deal with topics of largely engineering interest (heat flow, heat engines, etc.) or of interest exclusively to physicists (such as the theory of thermo-electricity etc.) The meaning of the three "laws of thermodynamics" will be discussed and they will be applied to the calculations of Homogenous and heterogeneous chemical equilibria vapor-solid equilibria ideal and non-ideal solutions, surface tension, etc. The interpretation of the "Third Law" in statistical terms will be briefly discussed and the problem of the calculation of absolute entropies and of Free Energies of substances gone into in detail. The approach toall these problems will be of the type used by Gibbs (rather than the elementary approach as used by Lewis and Randall in their book, for instance) and hence these taking the course are expected to be familiar with differential and integral calculus, including partial differentiation. Otherwise the prerequisite is a course in elementary physical chemistry.

62. Radio Chemistry

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Lecturer: J. W. Kennedy

Hours: Wed & Fri 4:15 - 5:30 p.m. Rm. B-223

Prerequisite: B.S.Degree in Chemistry or equivalent; or by special arrangement.

Textbook: None. Some reference books recommended including & Davidson

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Description of Course: Natural radioelements, radioactive decay, nuclear transmutation, accelerating devices, radiations from radioactive substances detection techniques, the study of radio-isotopes, new elements, chemical behavior at very low concentrations, carriers, tracers, exchange reactions, biochemical studies and other applications.

63. Theoretical Organic Chemistry

Lecturer: Mr. Lipkin

Hours: Mon. 9:00 - 10:15 a.m. Rm. B-223
Thurs. 10:30 - 11:45 a.m. Rm. B-223

Prerequisite: 1 yr. Elementary Organic Chemistry
1 yr. Elementary Physical Chemistry

Textbook: "Theory of Organic Chemistry"- Branch & Calvin (Recommended.) 4

Description of Course: Electronic structure of organic compounds; effect of resonance on the properties of organic systems; the relationship between physical properties and the structure of organic compounds.

PHYSICS

71. Theoretical Mechanics

Lecturer: ~~Cmdr. Bradbury~~ MR KELLER

Hours: Mon. 9:00 - 10:15 a.m. Sigma 47
Thurs. 10:30 - 11:45 a.m. Sigma 47

Prerequisites: A.B.Degree in Physics, or equivalent amount of undergraduate Physics; Differential Equations

Textbook: ~~"Introduction to Theoretical Physics" - Slater & Frank (Recommended)~~ 4
WHITAKER ANALYTICAL DYNAMICS

Description of Course: A course in the dynamics of particles, rigid bodies, elastic media, and fluids. Topics to be taken up will include vector analysis; particle dynamics; Lagrange's equations; Hamilton's equations; rigid body dynamics; vibrating systems; coupled systems and normal coordinates; dissipative systems; elastic media and hydrodynamics.

72. Electro-Magnetic Theory

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Lecturer : H. A. Bethe

Hours: Tues & Fri. 10:30 - 11:45 a.m. Rm. B-223

Prerequisite: Calculus, Differential Equations, and an undergraduate course in Electricity and Magnetism, or its equivalent.
Textbook: Abraham & Becker (Recommended.) 6
Description of Course: The course will start by setting down and explaining Maxwell's equations. Various phenomena will be derived from these equations; a relatively short time will be devoted to electro-statics, an extensive treatment will be given of stationary currents and their magnetic fields and of high frequency electromagnetic waves. Electromagnetic cavity resonators and

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wave guides will be discussed. Relativity electrodynamics will conclude the course.

73. Statistical Mechanics

Lecturer: L. I. Schiff

Hours: Mon. 9:00 - 10:15 a.m. Gamma 49
Thurs. 10:30 - 11:45 a.m. Gamma 49

Prerequisite: Theoretical Mechanics and Modern Physics
Quantum Mechanics desirable.

Textbook: "Statistical Mechanics" - Tolman (Recommended) 3

Description of Course: First Part, General Theory (8 to 10 weeks.) Introduction; classical statistical mechanics; detailed balance and the H-theorem; quantum statistical mechanics. Second Part, Application (6 to 8 weeks). (It will probably be possible to discuss briefly 3 or 4 of the topics listed below; these will be selected in consultation between students and instructor.) Free electron theory of metals; specific heats; electromagnetic radiation; fluctuations; imperfect gases; atomic nuclei; cooperative phenomena; equilibria in gases; reaction rates in gases.

74. Elementary Quantum Mechanics

Lecturer: E. Teller

Hours: Mon & Wed 10:30 - 11:45 a.m. Rm. B-223

Prerequisite: Theoretical Mechanics; Electromagnetic Theory, Differential Equations

Textbook: None for the time being.

Description of Course: A systematic description of the laws of quantum mechanics and their relation to classical physics. Specific topics to be discussed: correspondence principle, wave-particle dualism uncertainty principle, Schrodinger- and matrix-formulation of quantum mechanics, the electron spin.

75. Nuclear Physics

Lecturer: Manley and Weisskopf

Hours: Tues & Thurs 9:00 - 10:15 a.m. Rm. B-223 (Section I)
Wed. & Fri. 7:45 - 9:00 p.m. Rm. B-223(Section II)

Prerequisites: One semester Quantum Mechanics; Modern Physics (Atomic Spectra, Structure Elementary Particles.)

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Textbook: None

Description of Course: 1. Elementary particles and properties; 2a. Systematics of Nuclear Structure; nuclear reactions; alpha decay; fission. 2b. Observational methods. 3. Deuteron system p-n scattering. 4. Theory of beta and gamma decay. 5. Theory of nuclear reactions.

76. Neutron Physics

Lecturer: E. Fermi

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Hours: Tues & Thurs 9:00 - 10:15 a.m. Sigma 47

Prerequisites: Differential equations; introduction to theoretical physics; a knowledge of the elements of Nuclear Physics; Introduction to Quantum Mechanics desirable.

Textbook: None

Description of Course: Neutron sources (radioactive sources, accelerating machines, piles) (1). Neutron reactions (capture, scattering, etc..) (6). Neutron detection (fast detectors - radioactive detection, counters, fission counters, etc..) (3). Slow neutrons (include diffusion theory, velocity selector) (6). Fission by neutrons, Chain reaction (2). Slow neutron piles (10). Fast neutron chain reactions (6).

77. Hydrodynamics

Lecturer: R. E. Peierls

Hours: Wed. & Fri. 4:15 - 5:30 p.m. Sigma 47

Prerequisite: Theoretical Mechanics, Differential Equations.

Textbook: LA-165

Description of Course: Kinematics of continuous medium. Lagrange and Euler variables, equation of continuity; Hydrostatics, Stresses, Definition of ideal fluid; Euler's equation; Bernoulli's theorem. Conservation laws. Vorticity; Thomson's theorem; Irrotational flow. Potential theory; Method of images; Complex variable; Flow around sphere and cylinder; Mapping; Flow around a corner; Airfoil theory; Application to free surfaces; Vortices. Viscosity; Equation for viscous flow; Poiseuille formula, flow between plates; Stokes law; Turbulence; Laws of similarity; Reynolds number; Examples of critical Reynolds numbers; Resistance coefficient; Boundary layers; Heat transfer; Theories of turbulence. Compressible fluids; Sound waves; Sound waves in medium of varying properties. Supersonic flow; Mach angle; Characteristics; Short waves; Hugoniot conditions; Rayleigh-Taylor theory. Interaction of short waves.

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