Semester III						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	HS201T	Economics	3	0	0	6
2	BB401T	Basics of Cell Biology and Genetics	2	1	0	6
3	CH204T	Physical Organic and Bioorganic Chemistry (1st Half)	3	0	0	3
4	CH202T	Inorganic Chemistry (2nd Half)	3	0	0	3
5	MA401T	Introduction to Probability Theory	3	1	0	8
6	PH201T	Waves, Oscillations & Optics	2	1	0	6
7	MA102L	Mathematics Laboratory	0	0	3	3
		Total Credits				**35**

1	**Title of the course** (L-T-P-C)	**Economics** **(3-0-0-6)**
2	**Pre-requisite courses(s)**	--
3	**Course content**	Basic economic problems. resource constraints and Welfare maximizations. Nature of Economics: Positive and normative economics; Micro and macroeconomics, Basic concepts in economics. The role of the State in economic activity; market and government failures; New Economic Policy in India. Theory of utility and consumer's choice. Theories of demand, supply and market equilibrium. Theories of firm, production and costs. Market structures. Perfect and imperfect competition, oligopoly, monopoly. An overview of macroeconomics, measurement and determination of national income. Consumption, savings, and investments. Commercial and central banking. Relationship between money, output and prices. Inflation - causes, consequences and remedies. International trade, foreign exchange and balance payments, stabilization policies : Monetary, Fiscal and Exchange rate policies.
4	**Texts/References**	• P. A. Samuelson & W. D. Nordhaus, Economics, McGraw Hill, NY, 1995. • A. Koutsoyiannis, Modern Microeconomics, Macmillan, 1975. R. Pindyck and D. L. Rubinfeld, Microeconomics, Macmillan publishing company, NY, 1989 • R. J. Gordon, Macroeconomics 4th edition, Little Brown and Co., Boston, 1987. • William F. Shughart II, The Organization of Industry, Richard D. Irwin, Illinois, 1990. • R.S. Pindyck and D.L. Rubinfeld. Microeconomics The (7 Edition), Pearson Prentice Hall, New Jersey, 2009. • R. Dornbusch, S. Fischer, and R. Startz. Macroeconomics (9th Edition), McGraw-Hill Inc. New York, 2004.

1	**Title of the course** (L-T-P-C)	**Basics of Cell Biology and Genetics** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	None
3	**Course content**	• QuantitaIntroduction to genetics • Mendelian genetics: Mendel's law and examples, Monohybrid and di-hybrid cross, recessive and dominant mutation, concept of allele • Non-Mendelian genetics: incomplete dominance, semi- dominance, and introduction to epigenetics, Cytoplasmic inheritance, infection heredity. • Genetic interactions: approach towards generating a network (epistasis, redundancy, synthetic lethality, lethal interactions) • Model organisms and studies on molecular and genetic interactions • Structure of prokaryotic and eukaryotic cells • Introduction of cell biology, classification of living organisms, Prokaryotic cells, eukaryotic cells. • Membrane structure and function. • Structure and Composition of the Cell Membrane, Membrane Proteins, Transport across the Cell Membrane. • Structural organization and function of intracellular organelle • Structure and function of cytoplasm, Cytoskeletal elements and architecture, Structure and Function of mitochondria, Ribosomes, Endoplasmic reticulum, Rough endoplasmic reticulum and protein secretion, Lysosomes, The Golgi Complex, Peroxisomes, Vacuoles, plant cell organelles, Cell locomotion
4	**Texts/References**	• Anthony JF Griffiths et al., An Introduction to Genetic Analysis W.H. Freeman and Co 7th Edition 2000 • Watson et. al., Molecular Biology of the Gene, Pearson, 7th Edition 2013 • Jocelyn E. Krebs et al., Lewin's Gene Jones & Bartlett Learning; 11 edition (December 31, 2012) 4. Richard Kowles, Solving Problems in Genetics Springer; 2001 edition (June 21, 2001) • Gerald Karp, Cell Biology, WILEY (Feb. 4th, 2013) • Bruce Alberts et al., Essential Cell Biology; Richard Goldsby and Thomas J, &F/Garland, 4th Edition, (2014) • Alberts, Bruce.; Molecular Biology of the Cell, Garland Science; 5th edition (2 January 2008)

1	**Title of the course** (L-T-P-C)	**Physical Organic and Bioorganic Chemistry** **(3-0-0-3)**
2	**Pre-requisite courses(s)**	Fundamental concepts and applications of chemistry (CH101)
3	**Course content**	Symmetry-adapted orbitals, pericyclic reactions and frontier molecular orbital approach (FMO), Mixing rules and build-up approach to molecules, Thermodynamic and kinetic control of reactions, linear free energy relationships, Hammond's postulate, Curtin-Hammett principle, substituent and reaction constants, isotope effects, Stereoelectronic effects, reaction mechanism models 1. Organic chemistry of biological macromolecules (proteins, carbohydrates, nucleic acids, fats etc.) and chemistry of biological pathways, chemical biology and role of chemistry in understanding life processes and medicine
4	**Texts/References**	1. E. V. Anslyn and D. A. Dougherty, *Modern Organic Chemistry*, University Science, 2005. 2. Carey, F. A., Sundberg, R. J. *Advanced Organic Chemistry*, *Part A and B*, Springer, 2007. 3. T. H. Lowry and K. H. Richardson, *Mechanisms and Theory in Organic Chemistry*, Harper and Row, 1976. 4. Isaacs, N. S. *Physical Organic Chemistry*, Prentice Hall, 1996. 5. Deslongchamps, P. *Stereoelectronic Effects in Organic Chemistry*, Elsevier Science, 1983. 6. B. G. Davis & A.J. Farbanks, Carbohydrate Chemistry, 1st Edition, Oxford University Press, 2002 7. S. Doonan, Nucleic Acids, 1st Edition, RSC Publishing House, London, 2000 8. A. Lehninger, D. L. Nelson, Cox, M. M. Principles of Biochemistry, 5th Edition, W.H Freeman, 2008

1	**Title of the course** (L-T-P-C)	**Inorganic Chemistry** **(3-0-0-3)**
2	**Pre-requisite courses(s)**	Fundamental concepts and applications of chemistry (CH101)
3	**Course content**	Concepts and principles of non-transition metal chemistry: An overview of bonding models (ionic & covalent) in inorganic chemistry , Chemical forces, Bent's rule, Application of molecular orbital theory to triatomic linear molecules (localized and delocalized orbitals), Walsh diagrams. Main group Chemistry: General characteristics of s- and p-block elements, comparative study of second short period elements (B to F) with heavy congeners (Al to Cl). Electron deficient molecules and hypervalency.
4	**Texts/References**	1. Atkins, P., et al., Shriver and Atkins Inorganic Chemistry, 4th Ed., Oxford University Press, 2006. 2. Lee, J. D., Concise Inorganic Chemistry, 5th Ed., Blackwell Publishing, 2006. 3. Cotton, F. A., Wilkinson, G., Gaus, P. L., Basic Inorganic Chemistry, 3rd Ed., John Wiley and Sons Press, 1995. 4. Douglas, B., McDaniel, D., Alexander, J., Concepts and Models of Inorganic Chemistry, 3rd Ed. Wiley India (P.) Ltd., India, 2010.

1	**Title of the course** (L-T-P-C)	**Introduction to probability theory** **(3-1-0-8)**
2	**Pre-requisite courses(s)**	None
3	**Course content**	Combinatorial probability and urn models, Independence of events, Conditional probabilities, Random variables, Distributions, Expectation, Variance and moments, probability generating functions and moment generating functions, Standard discrete distributions (uniform, binomial, Poisson, geometric, hypergeometric), Independence of random variables, Joint and conditional discrete distributions. Univariate densities and distributions, standard univariate densities (normal, exponential, gamma, beta, chi-square, Cauchy). Expectation and moments of continuous random variables. Transformations of univariate random variables. Tchebychev's inequality. Modes of convergence. Law of large numbers. Central limit theorem.
4	**Texts/References**	• 1. K. L. Chung and F. AitSahlia, Elementary Probability Theory., 4th Edition, Springer Verlag, 2003 • R. Ash : Basic Probability Theory, Dover publication, • W. Feller : Introduction to Probability Theory and its Applications, Volume 1, Wiley-India Edition • W. Feller : Introduction to Probability Theory and its Applications, Volume 2, Wiley India Edition

1	**Title of the course** (L-T-P-C)	**Waves, Oscillations and Optics** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	
3	**Course content**	Linear oscillators. Coupled oscillators and normal modes with mechanical and electromagnetic examples. Inertia, restoring force and damping. Driven systems and resonance. The continuum limit. Waves and wave equations. Dispersion relations. Phase. Interference and diffraction. Wave packets. Impedance, reflection, absorption and transmission. Polarization. Geometrical optics. Brief introduction to nonlinearity.
4	**Texts/References**	1. Waves, Berkeley Physics Course (Vol 3), Frank S. Crawford Jr., McGraw Hill, 2017. 2. Vibrations and Waves, G. C. King, John Wiley & Sons, 2009 3. Optics, Principles and applications, K. K. Sharma, Elsevier (2006) 4. Optics, M. V. Klein and T. E. Furtak, Wiley (1986) 5. Principles of Optics, M. Born and E. Wolf, McMillan, 1974. 6. Introduction to Modern Optics, G. B. Fowles, Dover, 1975. 7. Fundamentals of Optics, F. Jenkins and H. White, McGraw Hill, 2017.