

Sr	Course no.	Course name	Credits	Instructor	Description
1	HS151	Advanced English	3-0-0-3	Suman	The course offers a wide range of short stories and poems for study. The aim of the course is to expose the students to a variety of writing styles, genres and thoughts over a period of time from America, Britain, Europe, and India. Divided into four modules, the course also involves one play and one novel for self study.
2	HS351	Popular Fiction	3-0-0-3	Suman	The focus of the course is to study a selection of popular fiction novels, that includes graphic novels as well. The aim of the course is to expose the students to new styles of writing, the increasingly popular medium of "cartoon" novels. The course envisages an analysis of four novels spread over one semester.
3	ME351	Management of Manufacturing and Logistics Systems	3-0-0-3	Dr. Niraj Sinha	In today's global economy, manufacturing and service companies no longer function in isolation, but have to interact closely with various stakeholders along their supply chains such as suppliers, business partners, outsourced companies, subcontractors, intermediaries and final customers. Companies spend billions of dollars in procurement, transportation, manufacturing, inventory, distribution and finally meeting customers' product and service needs. These functions are extensive and span across companies and continents around the globe. The main objective of this course is to introduce and examine the role of coordination and integration of various functions along the supply chains via a system-wide thinking. Students will be exposed to ideas from business strategy, project management, risk management, trade-off analysis and economics.
4	PH-341	X-rays as a probe to study material properties	3	Dr. Bindu Radhamany	This course deals in understanding the basic interaction of x-rays with matter and the kind of information one can draw to understand material properties using some of the state-of-the-art techniques installed on laboratory and synchrotron radiation sources. The application of x-rays have not only revolutionized our knowledge of matter at the fundamental level of atoms, electrons and spins but also redefined entire fields of science like physics, chemistry, biology and medicine. There are about 19 Nobel prizes awarded for x-ray related works. You will get the experimental flavour of the quantum mechanics and solid state physics using the state of the art techniques. The techniques which we study here are currently used in understanding the emergent phenomena which forms the basis for making magnetoelectric, spintronic, superconducting, ferroelectric, dielectric, magnetic, thermoelectric, fuel cell and battery applications etc. Focus will be made to understand the basic theory, experimental and the extraction of information from the experimentally collected data
5	PH343	Fundamentals of Photonics	3-0-0-3	Dr. P. K. Pathak	In this course applications of light in modern technologies will be introduced. The main focus will be on the wave and particle nature of light, transmission, detection and interaction of light, optical information propagation and different applications of photonic technologies. The main topics covered in the course include optical fibres, wave guides, polarization of light, interference and diffraction of light, lasers, detectors, photonic crystals, metamaterials, light emitting diodes, quantum dots and solar cells. The concepts of modulation of light through the electro-optic and acousto-optic effects will also be included.
6	EE 307	Basic Measurement Theory and Practice	3	Barathram. Ramkumar	Advancement in science and technology are directly related to the sophistications in the measurement techniques. New discoveries in science in technology must be backed by actual measurements. Measurements not only help us to validate a new hypothesis but also aid us in the better understanding of the problem. Measurements play a very important role in the design, development, and maintenance of an industrial process. Engineers involved in the design and development of new equipments and processes must have a good understanding of the measurement techniques that may be used to validate their design. This course will emphasize on accepted procedures for analyzing a measurement problem. The course will also address some of the important measurement techniques used in the industry. Students taking this course will be able to address the following fundamental questions related to measurement theory: <ul style="list-style-type: none"> How to establish a relationship between the real value of a variable and that actually measured? How can a measurement plan be devised so that the measurement provides the unambiguous information sought? How can a measurement system be used so that the engineer can easily interpret the measured data and be confident in their meaning?
7	HS 253	Introduction to Sociology	3	Dr. Ashok Kumar M	This course focuses on basic concepts and theories involved in increasing the understanding of human behavior and human societies. With the help of sociological perspectives, the interrelations among human societies, individuals, organizations, and groups are analyzed. Topics of analysis include culture, social interaction, social institutions, social stratification, community, and various social change strategies.
8	HS 353	Science, Technology and Society	3	Dr. Ashok Kumar M	Science and technology influence almost every aspect of human life. This course focuses on the increasing complexities of the interrelationship between science, technology and society. Social, political and cultural values affect scientific research and technological innovations, and in turn scientific research affects society, politics and culture. This course deals with philosophical and sociological aspects of technological change in society. The central focus of this course is to highlight the active role of society, culture and politics in the field of science & technology.
9	PH 342	Laser Science and Applications	3	Suman Kalyan Pal	Lasers are devices that produce intense beams of light which are monochromatic, coherent, and highly collimated. Because of these properties, lasers are used in a wide variety of applications in all walks of life. Lasers find applications in manufacturing, electrical and electronics industries, in medical treatments for radiation therapy, cosmetic, and surgical procedures, in military systems as rangefinders, and target designators, and in basic research. This course contains basic concepts and applications of lasers in research and industry. Working principle and applications of various lasers (e.g., Solid state lasers: Ruby Laser and Nd: YAG laser, Gas lasers: He-Ne laser, CO ₂ laser and Nitrogen laser, Liquid lasers: Dye lasers, Semiconductor lasers, Free electron lasers) will be discussed here. Some time will be spent to study various techniques of laser pulse generation and use of short pulses in spectroscopy. Mechanism of higher harmonic generation will be explained at some point. Applications of lasers in optical communication and Holography will also be covered in this course.
10	ME353	Electronic Materials and Their Applications	3	Dr. Rahul Vaish	Science and technology have made amazing developments in the design of electronics and machinery using standard materials, which do not have particularly special properties (i.e. steel, aluminum, gold). Some materials have the ability to change or size simply by adding a little bit of heat, or to change from a liquid to a solid almost instantly when near a magnet. These materials are called smart materials. Smart materials have one or more properties that can be dramatically altered. Most everyday materials have physical properties, which cannot be significantly altered (for example if oil is heated it will become a little thinner), whereas a smart material with variable viscosity may turn from a fluid which flows easily to a solid. Some everyday items are already incorporating smart materials (coffeepots, cars, the International Space Station, eyeglasses, aircrafts, for use in the medical branch . . .) and the number of applications for them is growing steadily. The course will provide a detail review of the properties and opportunities presented by state-of-the-art Smart Materials.
11	HS255	India since Independence	3	Manu V D	This course offers an introduction to the history of India since independence. It begins with an overview of the struggle for independence and its immediate fallout. It then proceeds to examine the political and economic history of India in broad outline. The course shall also focus on various movements and uprisings witnessed in India in the six decades since independence, besides looking into the question of identity. Finally, the developments in science and technology, literature, entertainment and sports will also be taken up for discussion.
12	HS352	India Through its Epics	3	Manu V D	This course offers an introduction to India as represented in its epics. While it aspires to cover a wide range of epics from different languages and periods, the focus in the present semester shall be largely on the <i>Ramayana</i> . The course intends to look afresh at the diverse traditions of India through the <i>Ramayana</i> , and to understand what indeed constitutes these traditions and in what ways they are relevant for life today. In other words, it seeks to comprehend the myths, legends, symbols, motifs and ideas from the <i>Ramayana</i> which inform polity over the ages and how they effectively constitute its self understanding.
14	CS547	Network Management Systems	3	T.A. Gonsalves	Computer networks are becoming larger, more complex and more critical to society. A typical network consists of routers, switches, servers, and PCs connected by assorted links – copper, optical fibre, wireless, etc. Even many cellphones today have a TCP/IP stack and are intelligent nodes in the network. The proper functioning of the network as a whole depends on the behaviour of every node and link in the network. Remote monitoring and control of these diverse and far-flung elements is essential. SNMP is a widely-used standard for remote management of IP networks. In this course, we will cover essential aspects of the SNMP standards. We will see how network management is performed using SNMP
15	CS599	Topics in SNMP and Network Management	2	T.A. Gonsalves	Computer networks are becoming larger, more complex and more critical to society. A typical network consists of routers, switches, servers, and PCs connected by assorted links – copper, optical fibre, wireless, etc. Even many cellphones today have a TCP/IP stack and are intelligent nodes in the network. The proper functioning of the network as a whole depends on the behaviour of every node and link in the network. Remote monitoring and control of these diverse and far-flung elements is essential. SNMP is a widely-used standard for remote management of IP networks. In this course, we will cover essential aspects of the SNMP standards. We will see how network management is performed using SNMP. The Course will operate largely in a directed self-study mode. There will be two quizzes, several assignments and a mini-project. The mini-project may cover customisation of NMS platforms, development of network management applications, etc.
16	EE 501	Power System Operation and Control	3	Dr. Trapti Jain	The course will mainly focus on economic and secure operation of power system. It is intended to present the techniques used to run the system economically, to analyse the security of power system and the control techniques used to maintain security. Apart from this, a brief introduction to electricity markets and the challenges in its operation will be discussed. The pre-requisite for this course is a good background in power system fundamentals (e.g. undergraduate course on power system).
17	EE502P	Analog System Design Lab.	2	Dr Genemala Haobijam and Dr Trapti Jain	Analog System Design Lab course is about understanding the analog and mixed-signal signal processing and build analog systems using analog ICs and study their macro models, characteristics and limitations. The course will deal on how to develop a macromodel for an IC based on its terminal characteristics, I/O characteristics, DC-transfer characteristics, frequency response, stability characteristic and sensitivity characteristic. Most of the experiments in the Analog System Lab course will concentrate on building analog systems using basic components like general purpose operational amplifier, wide-bandwidth, precision analog multipliers etc. We will learn how to build gain stages, buffers, instrumentation amplifiers, integrators, differentiators, filters, voltage regulators, function generator, voltage controlled oscillators etc. The course will enable the student to understand and address the challenges as a system designer.
18	ME352	Finite Element Method in Engineering	3-0-0-3	Dr. Rajeev Kumar	The finite element method (FEM) is a numerical and computer-based technique for finding approximate solutions of partial differential equations (PDE) of physics and engineering by discretization of the domain of analysis into elements. It is recognized by developers and users as one of the most powerful numerical analysis tools ever devised to analyze complex problems of engineering. The technique has very wide application, and has been used on problems involving stress analysis, fluid mechanics, heat transfer, diffusion, vibrations, electrical and magnetic fields, etc The Objective of this course is to provide the basic concepts of finite element method and its applications to wide range of engineering problems.
19	CH344	Food Chemistry: Processing, Preservation and Storage		Subrata Ghosh	Food chemistry, a part of food science, is mainly an interdisciplinary study which involves a broad range of disciplines like chemistry, microbiology, biology, engineering, and biotechnology. The subject talks about the properties and role of different constituents in foods, and also the changes that might occur during handling, processing, and storage. In addition, the course will help knowing in detail about the various important nutrients in human nutrition. The course will help the students to better understand the properties of foods and related materials and also the associated changes occur during processing, preservation and storage. The course is designed as a combination of theory and practical. <u>Course related experiments will be carried out on Saturdays.</u>
20	Cy 701	Advanced physical methods in chemistry: Theory and Applications		Dr. Chayan Kanti Nandi	Objectives: To make scientific background stronger in fundamental physical methods in chemistry. Researchers will be benefited for a better understanding of the basic of advanced spectroscopic techniques which might be helpful in their research. The course mainly will cover the following topics. Unit 1: Quantum Chemistry and molecular symmetry Unit 2: Interaction of light with matter Unit 3: Rotational and Vibrational Spectroscopy Unit 4: Nuclear Magnetic Resonance Spectroscopy Unit 5: Advanced spectroscopic techniques like fluorescence Correlation spectroscopy, single molecule techniques. Unit 6: Mass spectrometry
21	ME-354	Science and Technology of thin films	3-0-0-3	Akansha Dwivedi	Solid-state devices form the basis of integrated circuits, which have a variety of electronic, optoelectronic, and magnetic applications. The research in this field is concerned with design, fabrication and characterization of novel materials and devices with sub-micron feature sizes. Their potential applications include very high-speed devices, optical sources and detectors, optoelectronic components and all-optical devices. The design and fabrication of devices and integrated circuits are inextricably related to device physics, solid-state materials, and sophisticated processing techniques. This course aims to provide an introduction to the science and technology of thin films, with special emphasis on methods to produce thin films and relationships between growth conditions and thin film properties. Topics include (1) various methods of thin film production, such as evaporation, sputtering and chemical vapour deposition, (2) nucleation and growth processes, (3) dimensional, chemical, and structural characterization of thin films and (4) properties and applications.
22	CY342	Nanoscience: Understanding small systems	3-0-0-3	Aniruddha Chakraborty	The course will provide an introduction to nanoscience. Some of the fundamental concepts used to study the world at the nanoscale will be discussed in detail. Understanding of this concept is fundamental in understanding how nanoscale interactions and phenomena differ from those in our common macroscale world. Finally this course will provide specific study of the application of nanotechnology to different areas of science.