Semester III

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical / Practice		
Health Data Analysis[#] DSE-1,	4	0	0	4	12th Pass	NIL

 # This course will also be available to the students in semester V

Learning Objectives
This is a practical based module is designed to:
● Introduce students to the complexity of data related to health and diseases.
● Introduce to the students the method of collection of data, their visualization and analysis

Learning outcomes
After studying this course, the students will be able to:
● Comprehend and handle complex data related to health and diseases, which are usually large.
● Do survey-based research for data collection, their visualization by different methods and their analysis including the statistical analysis

Syllabus
Practicals -   **(120 Hours)**
● Art and Science of preparation of questionnaire for collection of health data: types and ethical consideration
● Types of data: Likert scale data and quantitative data related to health and diseases their collection methods
● Understanding how data is organized to facilitate analysis in the healthcare setting.
● Data visualization through histograms and tables
● Data visualization through heat maps
● Integration, understanding and selection of appropriate data visualization techniques to effectively communicate results

- Identifying ways in which data quality can be compromised and applying remedies
- Evaluation of data from varying sources to create meaningful presentations.
- A survey-based research on epidemiology and public health by collecting real data from the field area. It will include study designing, data collection, visualization and analyses of the data
- The results will be used for the preparation of a project report/manuscript.

Essential/recommended readings
- Introduction to Data Science in Healthcare Reading:
  https://www.r2library.com/Resource/detail/1584265329/ch0007s0170
- Analytics and (Precision Medicine) Decision Support Reading:
  https://www.r2library.com/Resource/detail/0128006811/ch0014s0163
- Hype Cycle for Healthcare Providers, 2019 (Gartner) Reading: Pages 3-7
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- https://www.r2library.com/Resource/detail/0340950056/ch0004s0092
- Principal components analysis
  https://www.r2library.com/resource/detail/0803625642/ch0006s0141
  ANOVAhttps://www.r2library.com/Resource/detail/0781781531/ch0015s0490

DISCIPLINE SPECIFIC ELECTIVE COURSE -1 (DSE-1)
III. 4.6. Game Development using UNITY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Game Development using UNITY#, DSE 1,	4	0	0	4	Class XII pass with Mathematics	C++

 # This course will also be available to the students in semester V

Learning Objectives
The Learning Objectives of this course are
- to introduce the students to the game engine platform UNITY
- to give a basic on how to develop a game using this game engine.
- to design, develop and finalize a game on either an Android or an IOS platform

Learning outcomes

This course gives students an insight into developing a game either on a mobile or a desktop platform. Upon completion of the course the students would be able to-
- Possess basic ability to convert game idea into a working prototype
- Learn basic techniques for animation and simulation
- Extend the concept of game development on Web, console or VR platforms
- Develop a creative and aesthetic mindset by creating a good-looking functional UI for the developed game

Practicals -   **(120 Hours)**

The course will be conducted completely on a hands-on mode. The basic concepts will be explained and each concept will be augmented by small tasks initially on UNITY before designing and developing a game. The following tasks will be performed in lab:
- Introduction to Unity's Interface and Unity's Basics
- Rigid Bodies and Colliders
- Audio Source and UI Elements
- Moving Character with Code
- Introduction to Variables; Operations with Variables; Functions; Conditional Statements; Loops; Coroutines; Classes
- Creating animations, simulations and background
- Designing, developing and finalizing a game

Essential/recommended readings
- *Learning C# by Developing Games with Unity 5.x*, G. Lukosek, Packt publishing Ltd, 2016
- *Developing 2D Games with Unity: Independent Game Programming with C#*, Jared Halpern, Apress, 1st Edition, 2018
- *Unity in Action: Multiplatform Game Development in C# with Unity 5*, Joe Hocking, Manning publications, 3rd Edition, 2022
- *Unity From Zero to Proficiency (Foundations)*, Patrick Felicia, LPF publishing, 4th Edition, 2015

DISCIPLINE SPECIFIC ELECTIVE COURSE -1 (DSE-1)
III. 4.7. 3D printing using Blender

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
3D printing using Blender#, DSE 1,	4	0	0	4	Class XII pass with Mathematics	NIL

 # This course will also be available to the students in semester V

Learning Objectives
- To introduce the students to Blender
- to understand the basic concepts of 3D modelling and printing using Blender
- to identify the pitfalls in 3D printing
- to apply the slicing techniques and generate G code

Learning outcomes
This course gives students an insight into using the free and open source ware Blender for 3D printing. Upon the successful completion of the course the students are expected to generate 3D models of some simple objects like flower vase, geometrical figures, tessellation tiles, bottle lids, etc.

Practicals - (120 Hours)
The course will be conducted completely on a hands-on mode. The basic concepts will be explained and each concept will be augmented by small tasks initially on Blender before moving on to 3D printing. The following tasks will be performed in lab:
- Introduction to the User Interface and navigation in blender
- Creating simple geometrical objects like planes, cube, cylinder, cone, spheres, spirals, etc. on blender
- Movement, scaling and rotation transformations
- Simulation, animation and rendering
- Polygonal modelling for 3D printing
- 3D printing of simple geometrical objects
- Moving on to more complex 3D printing

Essential/recommended/ suggested readings
1. *Blender 3D printing tutorials for beginners,* https://all3dp.com/2/blender-3d-printing-tutorial/
2. *Blender for 3D printing design*

https://www.youtube.com/watch?v=5CyaeBBQIkc&list=PLvCZK2JKGQlNt8uEM5_J12Qj7eO5MqV03

3. *3D printing from zero to hero in Blender*
   https://www.udemy.com/course/learn-3d-printing/

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DISCIPLINE SPECIFIC ELECTIVE COURSE -1 (DSE-1)
III. 4.8. IT Project Leadership

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit-distribution of the course			Eligibility criteria	Prerequisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
IT Project Leadership[#], DSE 1, III.4.8	4	0	0	4	12th Pass	NIL

 # This course will also be available to the students in semester V

Learning Objectives

The key focus of this project-based course is to develop a deep understanding of facilitators and obstructions while developing and managing IT developments as a product and its life cycle. Innovations in IT have led some businesses to flourish, while others have faltered due
to massive changes brought by information technology. IT is hard to manage, therefore understanding its applications, planning and management are ensuring intended changes where innovations are realized and the unintended ones are kept under control. The course covers information system, information management, IT strategy, and IT governance

Learning outcomes

After completing this course, student should be able to;
- contribute to information system planning and strategy formulation in corporate enterprises and complex administrations.
- have a deeper understanding of a socio-technical approach to the deployment of IT in organisations
- understand frameworks for analysing strategic issues of IS deployment and a familiarity with the most relevant current issues.

- develop insight into cases of the strategic planning of information systems often demand

Syllabus   **(120 Hours)**

Practical -

- Understanding IT and software characteristics and applications. processes, methods and
tools. Scenario based view of IT manager's role and KRA's.
- Understanding evolving IT landscape and dynamics, IT and networking as applied to enterprises in public and commercial sector.
- Software management, Software life cycle, Process and Project metrics, Software quality management and assurance, software cost estimation, the make or buy decision, Automated estimation tools.
- IT enabled products or services, ITIL service management model, software as a service, software as a platform, IT service strategy, new service designing and development process, common IT setups and Systems.
- Fundamental aspects of daily IT operations, human factors in
organization, acquisition and procurement, research and Development, Logical planning.
Managing digital networks and security.
- Management Information Systems, Strategic planning in regulated and competitive IT industries, the management and marketing of a technology-based enterprise,
- Evaluating their legal constraints, responsibilities and ethics, Social and ethical aspects of IT, The principles and methods of asset valuation, Interpretation and measurement, financial statements risk assessment, Capital market, Capital budgeting and the effects of economic regulation on capital formation, IT Policy and Regulation

Essential/recommended readings

- Managing the Internet of Things: Architectures, Theories, and Applications Editors: Jun Huang & Kun Hua, Chongqing University, China & Lawrence Technological University, USA, ISBN9781785610288.
- "Management" by Stoner J A and Freeman R E, ISBN 10: 8131707040 / ISBN 3: 9788131707043
- "Management: Principles and Practice" by S K Mandal ISBN: 9788184952209, 8184952201 Edition: 1stEdition, 2011, Pages: 500.
- "Principles and Practices of Management" by Khusboo Manoj ISBN-10: 9380921128
ISBN-13: 978-9380921129.
- "Principles and Practice of Sport Management" by Carol A Barr, ISBN-13: 9781284034172 Product With Access Code, 606 pages.

DISCIPLINE SPECIFIC ELECTIVE COURSE -1 (DSE-1)
III.4.9. Fabrication of nanomaterials for devices

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Fabrication of nanomaterials for devices#, DSE-1,	**4**	**1**	**0**	**3**	**Class XII pass**	**Basic knowledge of science**

 # This course will also be available to the students in semester V

Learning Objectives

This course is designed to expose students regarding the fabrication and applications of various types of nanomaterials. Students will be performing hands-on experiments and will get themselves acquainted with the fascinating world of nanotechnology and it's interdisciplinary applications.

Learning outcome

Through this paper, students would be learning:
- About the basics of nanomaterials and characterization techniques
- To fabricate nanomaterials using chemical or green synthesis
- To characterize nanomaterials using various physicochemical techniques
- To explore the interdisciplinary applications of fabricated nanomaterials in electronic devices, optical devices, computing devices, health devices, drug delivery, environmental remediation and energy etc.

Syllabus

Theory (15 Hours)

Introduction of Nanoscience and nanomaterials; synthesis (Chemical as well green methods) and characterization techniques (including spectroscopic, X-RD, Zetasizer, electron micrography etc.); Discussion on basic, innovative and recent advancements in the field of nanostructures / Nano-formulations/ Nano-devices / Nano-sensors etc. for targeting various applications related to the interdisciplinary fields

Practicals - (105 Hours)
- Identifying a research problem based on fabrication of devices using nanotechnology
- Identifying the requirement of type of nanomaterials (nanoparticles, quantum dots, nanostructures etc.) depending upon their physical and chemical properties as per the identified research problem

- Chemical or green synthesis of nanomaterials based on the selective, identified protocols, which may later be modified for the novel method of synthesis
- Characterization of nanomaterials using various physicochemical techniques like UV-absorption spectroscopy, FT-IT spectroscopy, X-ray diffraction, Zetasizer, Dynamic light scattering, Scanning electron microscope (SEM), HR-TEM, FESEM etc. for understanding their size, shape, charge, morphology etc.
- Exploring the role of fabricated nanomaterials in electronic devices, optical devices, computing devices, drug delivery, environmental remediation and energy etc.

Essential/recommended readings
- Nanotechnology For Dummies; By Richard D. Brooker, Earl Boysen (2011), Wiley Publisher
- Nanotechnology: An Introduction; By Jeremy Ramsden (2011), Elsevier Science Publisher
- Research papers and reviews from journals of international repute like Nanotechnology Reviews (NTREV) journal, NANO Reviews, Nature Nanotechnology