203141 Computer Applications in Graphic Design

Prereq. (607101)

This course is an introduction to computer programs particularly Adobe Photoshop and Adobe Illustrator through appointed exercises and assignments of graphic design.

607333 Fundamentals of 2D Animation

Prereq. (104209 + 607332)

The course will cover the design and creation of two-dimensional animated graphics that can be used in multimedia applications. Students will learn how to use vector-based animation programs, and visual effects compositing programs to create narratives using storyboards.

607431 Three-Dimensional Animation

Prereq. (607333)

The course will cover animation techniques of characters in 3D Computer Generated Imagery. In this course, students will build complete human and non-human characters and rigs, and focus on the physical actions of bodies and on acting, lip sync and emotions expressions.

601316 Modern Programming Language

Prereq. (601315)

This course is designed for students to learn how to use Flutter to quickly develop high-quality, interactive mobile applications. Thus, the following topics will be presented: an introduction to development with Flutter, creating beautiful UI with Flutter, building Apps with state, leveraging Flutter packages to speed up development, structuring Flutter Apps, powering Flutter Apps with Backend data, Cupertino widgets and platform-Based UI, integrating Flutter Apps with Firebase, and working with state management.

601315 Internet Programming

Prereq. (607221+ 607294)

This course is designed to introduce the required information and practices related to Web programming. Subjects such as jQuery, PHP (the server-side scripting language), XML, JASON, domain name registration, and web hosting administration tools will be introduced. Furthermore, students will gain practical skills through lab work and course projects.

601343 Computer Organization & Architecture

Prereq. (601241)

This course introduces computer organization and architecture for the Intel 8086 family of processors. Emphasis will be on the structure of processor 8086 and its assembly language. This includes: ALU Design; Introduction to IBM PC assembly

Language; The processor status and the flag register; Flow control instructions; Logic, shift, and rotate instructions and their application; Stack application and introduction to procedures; Multiplication and division; arrays and addressing modes. Memory Hierarchy will be addressed in detail.

601432 Operating Systems

Prereq. (601343)

The course introduces the fundamental concepts of operating systems. It covers an introduction that includes the evolution of operating systems (OS), operating system structure, process and threads management, asynchronous concurrent execution, concurrent programming deadlock and indefinite postponement, processor scheduling, virtual memory organization and management and case studies.

603393 Human-Computer Interaction

Prereq. (607294)

This course introduces human-computer interaction field that integrates the capabilities of computer technology with human factors limitations. Topics covered: foundations, the human, the computer, the interaction, usability paradigms and principles, interaction design, understanding users, model of the user in design, affective aspects, interfaces and interactions, data gathering, design and construction of prototypes, evaluation techniques, context awareness.

607111 Programming Language for Virtual Reality

Prereq. (601104)

This course introduces the basic concepts of Object-Oriented Programming (OOP). Topics covered: OOP features including abstraction, encapsulation, inheritance, and polymorphism; Classes, objects, constructors, overloading and overriding, interfaces, packages, arrays (one dimensional and two-dimensional arrays) including some applications such as sorting and searching arrays and Exception Handling.

607101 Fundamentals of Virtual and Augmented Reality

Prereq. (601104)

This course is designed to introduce students to the field of virtual reality (VR) including: definitions of VR, Augmented reality (AR), and Extended reality (XR), the historical development of virtual reality technology and virtual reality as a research field, current virtual reality hardware and software, 3D sensing technologies, 360-degree cameras, VR apps and tools.

607221 Data Structures & Visual Programming

Prereq. (607111 + 103250)

This course introduces the main concepts of data structures. Topics covered: concepts of Abstract Data Types (ADT), specification of different data structures such as: (Lists, Stacks, Queues, Dictionaries, and Trees). It also introduces graphical user

interfaces (GUI) in C#. Event driven programming. The course provides hands-on practical aspects.

607225 Algorithms and Artificial Intelligence

Prereq. (607221)

This course introduces the concepts of designing and analyzing algorithms. Topics covered: definition of algorithms, classifying functions and computational complexities of algorithms, algorithms analysis & design techniques including divide and conquer greedy methods, backtracking, branch-and-bound, heuristics, pattern matching and string/text algorithms. This course will expose students to AI (Artificial Intelligence) approaches such as agent and multi-agent systems, path planning, and fuzzy for game development. Students will also learn some of the algorithms used for game development such as seeks, evade algorithms, pursuit, and flocking, etc…

607231 Computer Graphics for Virtual Reality

Prereq. (607101 + 103241)

This course introduces the principles of designing 3D graphics applications using OpenGL. Students will learn basic shading and lighting modeling and will study some algorithms for rasterization and clipping. The course covers theory and practical aspects.

607332 3D Modeling

Prereq. (607294 + 607111)

This course focuses on producing and shaping three dimensional objects, characters and interior and exterior environments using digital software, and understanding the different modeling techniques. Students will learn the tools to add colors, textures, and lights to the models and to set the camera with depth to achieve a professional result.

607350 VR Development & Design

Prereq. (607332 + 603391)

This course expands the students' practical experience of designing and developing Virtual Reality worlds for different applications (e.g., simulation, education, etc...). Hands-on experience through a project will provide students with deeper understanding of game engines, programming and 3D modelling.

607351 Virtual & Augmented Reality and 3D Interaction

Prereq. (60393 + 607332)

The course provides an overview of the state-of-the art in virtual reality technologies and 3D user interfaces, including: display systems, motion tracking, spatial interaction techniques, and human factors affecting interactions. Students will learn how to develop virtual reality experiences through hands-on programming assignments using Oculus Quest headsets.

607360 Game design

Prereq. (607332 + 607225)

This course is an introduction to the theory and practice of the process of designing games experiences. Students are familiarized with methods, concepts, techniques, and literature used in the design of games.

607461 Interactive Game development & Programming

Prereq. (607360)

This course provides an overview of the process of developing interactive games, focusing on aspects such as: Rapid prototyping, play testing, and design iteration using a player-centered approach.

607480 Graduation Project (1)

Prereq. (402201 + 607360)

This course is the first of a two-course sequence in which the students will develop a complete graduation project. This course considers as a preparation for GP2 by allowing students to form their teams, select the project idea in a particular area that related to one of information technology fields; understand project scope, study and review literature and previous work in their project idea. In addition to that, this course helps student to plan their work through the 2 semesters, collect all data needed to identify the project's requirements.

607485 Graduation Project (2)

Prereq. (607480)

This course is the second of a two-course sequence where the students will apply and integrate the knowledge of the development life cycle, and development tools, to design and build a fully functional information system to solve a business problem for organizations. The Graduation Project challenges students to go beyond the learning that occurs as the result of their prescribed educational program. Students shall complete their projects in areas of concentrated study under the direction and supervision of faculty members.

607400 Field Training

Prereq. (607350)

This course provides the ability to practice on using computer tools and applications in various fields, either in a public or private sector under the supervision of the department members. The purpose of the supervised field training experiences is for students to synthesize the knowledge and skills developed during the academic portion of the program in a practical setting. Field training is both a learning experience for students and contributes to the work undertaken by the field training site. The expectation is that the field training will provide learning opportunities unavailable in a classroom setting.

605161 Introduction to Data Communications & Networking

Prereq. (603101 + 601104)

This course introduces data communications and networking. Topics covered: applications, industry and benefits of different communications systems and networks (LAN, WAN, MAN, WLAN, WWAN), the standards for communication protocols, the fundamentals of data communications and its role in computer networks, packet and circuit switching, transmission and communications systems, the OSI and TCP/IP models, the main functions and protocols' examples of all layers are discussed.

603391 Systems Analysis & Design

Prereq. (607221)

This course introduces System Development Life Cycle (SDLC) covering: Requirements Engineering, requirements collection techniques (interviews, questionnaires, observation and joint application design), requirement analysis using the structural methodology (Data flow diagrams, data dictionary), process of system design including: architecture, input & output, user interfaces and data bases, introduction to project management, overview of system testing concepts, and system maintenance are introduced.

601318 Introduction to Internet of Things (IoT)

Prereq. (601315)

This course introduces the concept and technology of Internet of Things (IoT). IoT describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. Topics covered: basics of IoT, IoT various electronic components: sensors, actuators, microcontrollers, IoT programmability, the Raspberry Pi simple IoT applications, connectivity and networking, applications, IoT security and modeling.

601371 Multimedia Programming

Prereq. (607294)

This course introduces computer manipulation of images, sound, animation, and video. Topics covered are sampling, quantization, and encoding, several types of images compression and decompression techniques, color perception and presentation, basic image coding standards, video coding standards and implement the above multimedia techniques.

607407 Innovation & Entrepreneurship in VR

Prereq. (607350)

This course introduces students to the concepts of innovation, entrepreneurship, and creativity in information security. This course includes the following topics: private

sector entrepreneurship; public sector entrepreneurship; social entrepreneurship; types of innovation; innovation characteristics; phases of innovation, benefits of entrepreneurship and innovation to an economy; components of the creative process and creative techniques. Furthermore, the course explains the business model canvas and helps students understand the impact of innovation and entrepreneurship on organizations and society.

607408 Selected Topics in Virtual Reality

Prereq. (607351)

This course provides topics that are selected by instructors according to the interest of the department and students and cover the novel areas in current advancements in various information technology fields. Suggested topics include: advance-programming languages not included in the degree plan, advance topics in networks, advance topics in database, management information system, advanced topics in internet and web, case study in different areas.

607452 Applications & Systems of VR & AR

Prereq. (607351)

This course describes systems used in VR applications, and introduces the student to the various domains where VR/AR can be applied Examples of relevant applications

include health and medicine, simulation, learning, media, and defense…etc. Some illustrations of VR/AR will be provided for various domains.

607454 Virtual & Augmented Reality Case Studies

Prereq. (607351)

This course will introduce students to Augmented Reality (AR) and mixed Reality (MR) interfaces. In this course, students will create mini-projects focused on AR and MR, using prototyping tools.

607470 Latest Advancements in VR

Prereq. (607350)

This course aims at introducing the undergraduate students to the latest trends and topics in a variety of areas in information technology, the course structure based on group learning and instructional method that puts students into roles of greater autonomy and responsibility for their learning.

606384 Computer Vision

Prereq. (607225 + 103241)

This course presents an introduction to Computer Vision. Topics covered: basic principles of image formation, imaging processing algorithms, different algorithms for 3D reconstruction and recognition from single or multiple images (video). This course emphasizes the core vision tasks of scene understanding and recognition.

Applications to 3D modelling, video analysis, video surveillance, object recognition and vision-based control will be discussed.

601472 Image processing

Prereq. (607332 + 607225)

This course presents fundamental concepts of digital image processing. Topics covered: image formation (Sampling and quantization), image resolution (spatial, gray, color), and image enhancement in spatial domain (point to point enhancement (stretching, slicing, threshold), and area to point enhancement (smoothing, sharpening, and noise reduction)), enhancement in the frequency domain (sharpening, smoothing). The course also introduces the FFT theory in one and two dimensions in both continuous and discrete form; Image restoration; Image analysis, line detection, edge detection, segmentation techniques (threshold, splitting and merging, region growing); Image encoding such as Huffman and Run length are also introduced.

104209 Physics for Virtual Reality

Prereq. (607101)

Momentum: Impulse, Conservation of Momentum, Elastic, and Inelastic Collisions. Vibrations and Waves: Simple Harmonic Motion, Elastic Potential Energy, Frequency, Amplitude and Wavelength, the Speed of Waves on a String, Interference, and

Reflection of Waves. Elastic Properties of Matter: Stiffness hardness, Stress, Strain and Young's Modulus. Deformation. Sound: Producing Sound Waves and their Characteristics, Energy, Intensity, and Interference. Quality of Sound. The Ear. Light and Optics: Reflection and Refraction of Light. Mirrors, Lenses, and Images' formation. Wave Optics: Interference and Diffraction. Reading CDs. Optical Instruments; the Camera, the eye, the microscope, and the telescope.