Computer Graphics and Animation

12162	Fundamentals of Drawing and 2D Animation	Pre-requisite: None	Credit Hours: 3
	This course develops theoretical and practical training on the basics of drawing in addition to animating objects and characters digitally. The program covers the two-dimensional medium including the use of different materials (pencil, charcoal, pastel), tools (eraser, marker), and surfaces (cardboard, canvas). 2D Animation, as a form of digital drawing, is commonly used for illustration, animation, architecture, and engineering.		
12213	Data Structures in Visual Programming	Pre-requisites: 11206, 20134	Credit Hours: 3
	Basics of algorithm design and analysis. Basic data structures. Sequential and linked representation of data structures. List, Ordered List, Sets, Stack, Queue, tree, Binary trees, graph and network in visual programming. An introduction to graphical user interfaces (GUI). Event driven programming. Windows onscreen objects: command buttons, text boxes, option buttons, and graphics. Programming projects will require students to design interactive screens as well as code subroutines to implement the programs. The course covers theory and practical aspects.		
12242	Web page Design and Internet Programming Lab	Co-requisite: 12243	Credit Hours: 1
	Laboratory sessions on how to design interactive and dynamic WebPages. Technologies/Languages: HTML, CSS, JavaScript, and PHP.		
12243	Web page Design and Internet programming	Pre-requisite: 11206	Credit Hours: 3
	This course presents the principles of interactive of web sites design using HTML, DHTML cascading style sheets (CSS), and JavaScript. Then the course concentrate on designing web graphics using scalable vector graphics (SVG).		
12259	Computer Application in Computer Graphics	Pre-requisite: 11102	Credit Hours: 3
	The course introduces several concepts of design, art, and illustration as interpretations of real-world concepts. It develops theoretical and practical training that will allow students to apply the acquired technical knowledge of design software mainly Adobe Photoshop and Adobe Illustrator. Professional applications include photo editing and compositing, print design, and digital painting.		
12264	3D-Modeling	Pre-requisite: 12259	Credit Hours: 3
	This course focuses mainly on introducing 3D modeling for hard surface objects and environments using advanced 3d software. Student will be able to create 3D worlds and props depending on several tools and methods.		

12273	Computer Graphics	Pre-requisite: 11103	Credit Hours: 3
	This course aims at teaching students the principles of designing 3D graphics applications using OpenGL. Students will learn basic shading and lighting modeling and will study some of algorithms for rasterization and clipping. The course covers theory and practical aspects.		
12324	Human Computer Interaction	Pre-requisite: 11206	Credit Hours: 3
	This subject is an introduction to human-computer interaction. Emphasis will be placed on understanding human behavior with computing systems, knowing how to design, and evaluate interactive software using a human-centered approach, and general knowledge of HCI design issues with multiple types of interactive software.		
12343	Visual Programming	Pre-requisite: 11206	Credit Hours: 3
	This course aims to introduce the students who have built a solid background in console systems to the concepts of Visual/GUI design using structured and OO programming skills acquired in previous courses. Topics include Windows Forms and Controls, Event-Driven Programming, Error Handling, Files, Multi-threading, Animation as well as Data Driven Systems. The course also includes a design project, which brings together students coding, and user-interface design principles. After completing this course, the students are ready to undertake professional projects with added business value for clients within a Software Engineering or Systems Analysis context.		
12348	Multimedia Systems	Pre-requisite: 11206	Credit Hours: 3
	Fundamentals of computer-based multimedia. Audio. Images and graphics. Video Streaming. Compression. Multimedia database. Students will design and develop multimedia applications that combine text, images, sound, video, and animation.		
12351	Game Design	Pre-requisite: 12273	Credit Hours: 3
	A game engine course is dedicated to teach the core software component of a computer video game and interactive application with real-time graphics. This course provides the underlying technologies, simplifies development, and often enables the game to run on multiple platforms such as game consoles and desktop operating systems such as Linux, Mac OS X, and Microsoft Windows. The student will be able to learn the core functionalities that are typically provided by a game engine includes a rendering engine for 2D or 3D graphics, a physics engine or collision detection (and collision response), sound, scripting, animation, artificial intelligence, networking, streaming, memory management, threading, and a scene graph.		
12353	3D Materials and Lighting	Pre-requisite: 12264	Credit Hours: 3
	This course offers the knowledge in 3D texturing, lighting, and rendering. Students will be able to unfold any given 3D model in addition to manipulating materials and shaders to make them ready for the rendering process.		

12354	Algorithms and AI for Games	Pre-requisite: 12213	Credit Hours: 3
	This course introduces formal techniques of the design and analysis of algorithms. Algorithmic strategies: Brute-force, greedy, divide-and-conquer, backtracking, branch-and-bound, heuristics, pattern matching and string/text algorithms. This course will expose students to AI 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.		
12364	3D Animation	Pre-requisite: 12264	Credit Hours: 3
	This course gives deep knowledge for students to animate objects, cameras, and characters in the 3D world to make the animation performance believable and ready for games or movies. In addition to body language and acting. The course covers theory and practical aspects. The course covers theory and practical aspects.		
12367	3D Rigging and Skinning	Pre-requisite: 12264	Credit Hours: 3
	This course gives deep knowledge for students to rig and skin objects, characters, and creatures to make them ready to be used by animators.		
12373	Interactive 3D Graphics	Pre-requisite: 12273,12213	Credit Hours: 3
	This course introduces students to the theory and practice of interactive computer graphics. It aims to teach the fundamental principles of 3D interactive computer graphics. Students will apply mathematics, physics and computer programming to develop interactive graphics applications. Students will also learn fundamental techniques used in game development, such as shooting, character animation and controllers, Inputs, and Events. Unity is used as the platform for practical development, and as an example of a system which incorporates many of the algorithms of computer graphics.		
12442	Game Programming	Pre-requisite: 12354,12351	Credit Hours: 3
	This course aims to teach the student the fundamental techniques and algorithms that drive most computer and video games, students will learn the theory and study the implementation details of Game architecture, Design patterns, AI Techniques, Scripting, network programming and Engine Programming. The course covers theory and practical aspects.		
12446	Digital Image Processing	Pre-requisite: 11206,12348	Credit Hours: 3
	Human vision system. Artificial vision system. Cameras and display systems. Image formation, representation and digitization. Image restoration techniques: gray-scale and color modification, linear filter techniques for noise suppression and edge enhancement, non-linear filter techniques. Lossless and lossy compression techniques. Image analysis: segmentation and edge detection, shape descriptors. Frequency Domain Analysis. Image interpretation. Object detection. Pattern recognition. OCR. Biometrics techniques. Neural Network. The course covers theory and practical aspects.		

12447	User Experience	Pre-requisite: 12324	Credit Hours: 3
	This course provides introduction to the areas of study categorized under the umbrella of "user experience" including design principles, psychological principles, cognitive processes, visual perception and the important of usability over aesthetics.		
12448	Computer Vision	Pre-requisite: 12446	Credit Hours: 3
	This course provides an introduction to computer vision, including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification, scene understanding, and deep learning with neural networks. We will develop basic methods for applications that include finding known models in images, depth recovery from stereo, camera calibration, image stabilization, automated alignment, tracking, boundary detection, and recognition. Students will develop intuitions in class, and then learn about the difference between theory and practice in projects.		
12455	Selected Topics in Games	Pre-requisite: 12442	Credit Hours: 3
	The objective of this course is to introduce advanced or new topics in one of the areas of games.		
12461	Visual and Sound Effects	Pre-requisite: 12348	Credit Hours: 3
	This course provides students with exposure to the design, creation and production of audio in interactive applications and computer games. Students will become familiar with the use of sound libraries, recording sounds in the studio and in the field, generating sound with synthesizers, and effects processing. Students will create sound designs for interactive media, integrating music, dialog, ambient sound, sound effects and interface sounds within interactive programs.		
12467	Video Editing and Production	Pre-requisite: 12348	Credit Hours: 3
	The course develops theoretical and practical training on the principles of media making. From devising ideas to final productions on set, the program focuses on audiovisual language and techniques including basic use of camera, lighting, and staging. The course also covers editing and post-production essentials. Professional applications include film, television, animation, and institutional/corporate communications.		
12471	Selected Topics in Computer Animation	Pre-requisite: Set by the department	Credit Hours: 3
	The objective of this course is to introduce advanced or new topics in one of areas in computer animation, film production, and digital media.		
12473	Selected Topics in Computer Graphics	Pre-requisite: Set by the department	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of computer graphics.		

12479	Advanced Animation	Pre-requisite: 12364	Credit Hours: 3
	This course aims to teach the students advanced topics in computer animation, in particular advanced character and creature modeling and human anatomy using various programs such as Autodesk Maya and Mudbox.		
12481	Virtual and Augmented Reality	Pre-requisite: 12373	Credit Hours: 3
	This course will teach students the main principles of VR and AR applications. Students will learn the required mathematics for successful VR and AR applications, including interacting with virtual objects, tracking methods, and rendering for VR and AR. Students will also learn to build effective 3D interaction techniques to use VR applications such as selection, manipulation, wayfinding, menus, and teleporting. Student will learn to build different types of AR apps including location-based and vision based tracking methods. Selected game engine will be used as the platform for practical development and different VR and AR SDKs will be utilized. The course covers theory and practical aspects.		
12491	Practical Training	Pre-requisite: Finish 90 Credit Hours	Credit Hours: 3
	The student is required to do practical training in a well known software company for period of (2) months full time training with at least (5) hours per day, or 3 months part time training with at least (4) hours per day. For the part-time training the student is allowed to register for additional (6) credit hours in the first or in the second semester, or (3) credit hours for the summer semester. The student is asked to perform there some tasks that are related to his major, such as writing, developing, or learning some new software.		
12494	Graduation Project(1)	Pre-requisite: Finish 90 Credit Hours	Credit Hours: 1
	The graduation project aims to develop the student's skills and ability to deal with the real issues, study them, analyze them, and computer programming to solve them. This is achieved through an integrated project that is developed by the student within a group of students and supervised by a faculty member. The student is required to complete the project objectives and submit a final report. The project is discussed by a committee of faculty members.		
12495	Graduation Project(2)	Pre-requisite: 12494	Credit Hours: 2
	Students are required to develop a complete implementation fulfilling the project objectives and submit a final report. Project must be presented to a committee of the faculty		