

University of Information Technology and Communications (UoITC)

جامعة تكنولوجيا المعلومات والاتصالات



College of Medical Informatics

كلية المعلوماتية الطبية الحيوية



First Cycle – Bachelor's Degree (B.Sc.) - Science in Intelligent Medical Systems

بكالوريوس – علوم في الأنظمة الطبية الذكية



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Overview . ١

This catalog is about the courses (modules) given by the program to gain the Bachelor's Degree (B.Sc.) in Science of Intelligent Medical Systems. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج بكالوريوس العلوم في الأنظمة الطبية الذكية . يقدم البرنامج (٤٨) مادة دراسية ، مع (٦٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

Undergraduate Courses 2023-2024 . ٢

Semester 1

Module 1

Code	Course/Module Title	ECTS	Semester
ITC310000	Biology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
Biology is the scientific study of life and living organisms. Biology and bioinformatics are closely intertwined fields that complement each other. By studying biology at the beginning of the student's study, the student will explore the fundamental principles and concepts that govern life. The biology module will provide a foundation understanding of the diversity, complexity, and interconnectedness of life, and it continues to advance scientific knowledge and the betterment of human well-being. Moreover, this course will inform the students about the biodiversity, classification, and taxonomy of living kingdoms. Biology will also provide information about the cells and main differences between cells in prokaryotic and eukaryotic.			

Module 2

Code	Course/Module Title	ECTS	Semester
ITC310011	Computer programming I	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>Computer Programming is a fundamental course that introduces students to the concepts and principles of designing algorithms using flowcharts and implementing them in programming languages. It provides a comprehensive overview, equipping learners with essential skills to understand and write code. Students learn to analyze problems, develop logical solutions, and translate them into step-by-step instructions. Practical programming skills are emphasized, covering syntax, variables, loops, conditionals, and functions.</p>			

Module 3

Code	Course/Module Title	ECTS	Semester
ITC310020	Computer Fundamentals	4	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37
Description			
<p>This course aims to help students build up an understanding of what a computer is, its software system, hardware, and peripheral devices. Its purpose is to present, as clearly and completely as possible, the nature and characteristics of modern-day computer systems, giving them the fundamental principles of how computer systems work. The course will cover the whole computer components as software, processing unit and its internal registers and buses like internal and external buses. Also study types of system lines such as control, data, and address lines. Moreover, a detailed view of what computer internal and external storage are? A close sight is given to I/O devices for their importance in data and information translocation and transformation.</p>			

Module 4

Code	Course/Module Title	ECTS	Semester
ITC310030	Mathematics	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	93	57
Description			
<p>Mathematics is the fundamental language of computer science, allowing complex ideas to be formulated and developed. This course provides the sound basis of mathematical techniques and methods required by almost all other modules in the department Intelligent Medical Systems courses. Topics covered calculus. When successfully completing the module students will be able to Demonstrate problem solving skills using mathematics</p>			

Module 5

Code	Course/Module Title	ECTS	Semester
ITC310040	Introduction to Medical Informatics	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>Growing healthcare costs has generated the need for information specialists knowledgeable about emerging technical solutions that can help improve healthcare delivery and health decision-making not only for clinicians but also for patients and general health consumers. A growing number of healthcare providers are investing in information systems that will affect their operations and practices. Health consumers are taking a more proactive role in their healthcare to manage and navigate an increasingly complex healthcare environment and to live healthier lives. The course is oriented to the use of information technology in medicine and biology. It is focused on medical data: acquisition, storage and exploitation, systems based on patients' computer records, health information systems, decision-making in medicine, standards in medical informatics, and introduction to bioinformatics.</p>			

Model 6

Code	Course/Module Title	ECTS	Semester
ITC000000	Democracy and Human Rights	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>الديمقراطية هي أحد المثل العليا المعترف بها عالمياً والقائمة على قيم مشتركة تتبادلها الشعوب في مختلف أنحاء العالم، بغض النظر عن الاختلافات الثقافية والسياسية والاجتماعية والاقتصادية. وكما هو معترف به في إعلان وبرنامج عمل فيينا، تقوم الديمقراطية على إرادة الشعب المعبّر عنها بحرية لتقدير نظمه السياسية والاقتصادية والاجتماعية والثقافية ومشاركته التامة في جميع جوانب حياته. والديمقراطية والتنمية وسيادة القانون واحترام حقوق الإنسان والحريات الأساسية أمور مترابطة ومتداخلة. وتهدف الديمقراطية إلى:</p> <p>الحفاظ على كرامة الفرد وحقوقه الأساسية وتعزيزه</p> <p>تحقيق العدالة الاجتماعية؛</p> <p>تشجيع التنمية الاقتصادية والاجتماعية للمجتمع؛</p> <p>تعزيز تماسك المجتمع؛</p> <p>توطيد الأمن الوطني؛</p> <p>إرساء مناخ موات للسلام الدولي.</p> <p>وتعتبر الديمقراطية، كشكل من أشكال الحكم، مرجعاً أساسياً للجميع لحماية حقوق الإنسان؛ وهي توفر بيئة لحماية حقوق الإنسان وإعمالها إعمالاً فعلياً. واليوم، بعد مضي فترة على تحقيق الديمقراطية في مختلف أنحاء العالم، يبدو أن العديد من النظم الديمقراطية تراجعت. ويظهر أن بعض الحكومات تتعهد بضعف الديمقراطية، والقضاء على أي نقد، وتفكيك الرقابة الديمقراطية وضمان حكمها لمدة طويلة، مع أثرها السلبي على حقوق الشعب.</p>			

Semester 2

Module 7

Code	Course/Module Title	ECTS	Semester
ITC31012	Computer Programming II	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>Computer Programming II is an advanced course that focuses on basic data structures. Students learn to implement and manipulate various data structures to efficiently store and organize data. They become familiar with operations like insertion, deletion, and retrieval. The course also covers debugging techniques and code documentation. By the end of the course, students develop proficiency in algorithmic thinking, problem-solving, and understanding the software development life cycle. They gain expertise in working with data structures, honing their ability to design efficient algorithms. Overall, Computer Programming 2 enhances students' programming skills, enabling them to tackle complex problems and develop robust software solutions.</p>			

Module 8

Code	Course/Module Title	ECTS	Semester
ITC310050	General Anatomy and Physiology	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Anatomy and Physiology are the scientific study of the body structure and their functions. A single organism is composed of billions and trillions of cells, tissues, and organs. These structures include both microscopic and macroscopic. Cells are microscopic structures which are examined only under the electronic microscope, whereas organs and organ systems are macroscopic structures which can be easily seen through our naked eye. To study in detail about the structures and functions of organisms, the study of Anatomy and Physiology are applied. Both Anatomy and Physiology are derived from the Ancient Greek language, anatomy meaning study of the structure of organisms and physiology meaning the study of regular mechanisms, and their interactions that function within a living system.</p>			

Module 9

Code	Course/Module Title	ECTS	Semester
ITC310060	Molecular Biology	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>The course explores the development of molecular biology, the molecular structure, and the holistic role of the DNA molecule (the function of DNA as the initiator, interactions of biological molecules, particularly at the molecular level and the regulator of metabolic mechanisms comprehensively).</p> <p>Discussing gene expression related to transcription, translation, and control of expression at the molecular level in prokaryotes and eukaryotes; DNA replication mechanism; gene regulation mechanism; extrachromosomal DNA; proteomics and genomics; DNA repair, DNA mutation and the application of molecular biology in various fields.</p>			

Module 10

Code	Course/Module Title	ECTS	Semester
ITC310070	Logic Design	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>The course focuses on Logic design, it is a critical component in embedded interfaces, design logic using components that have been designed to work together, we can concentrate on their logical function, applications. Digital logic design forms the foundation of electrical engineering and computer engineering. Digital logic designers build complex electronic components that use both electrical and computational characteristics such as power, current, logical function, protocol, and user input. Students become familiar with basic digital hardware by constructing simple combinational circuits, and learning troubleshooting skills. And should become familiar with logic gates that perform the basic Boolean functions, such as AND, OR, NAND, NOR, Inversion, Exclusive-OR, Exclusive-NOR, K-Maps, Combinational and Sequential Circuit, Half and full Subtractor, Logic Circuits for Full Subtractor, Encoder and decoder, Multiplexers and Demultiplexer, Decoder Expansion, Latches, Counter.</p>			

Module 11

Code	Course/Module Title	ECTS	Semester
ITC310080	Medical Devices and Terminology	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Medical terminology refers to the specialized vocabulary used in the medical field to describe anatomical structures, medical conditions, treatments, procedures, and other healthcare-related concepts. It includes terms derived from Latin or Greek roots and combines prefixes, suffixes, and root words to form meaningful and standardized medical terms. Understanding medical terminology is essential for healthcare professionals to effectively communicate, document patient information, and ensure accurate interpretation of medical records and reports. Medical terminology is organized into various categories, including anatomical terms, diagnostic terms, therapeutic terms, surgical terms, and pharmacological terms. For example, anatomical terms describe the structure and location of body parts, while diagnostic terms refer to conditions or diseases identified through medical tests or examinations. Learning medical terminology is important for healthcare professionals, as it allows for clear and precise communication within the medical field. It also helps facilitate effective patient care, medical research, and the accurate documentation and exchange of medical information.</p>			

Module 12

Code	Course/Module Title	ECTS	Semester
ITC000031	English Language I	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>The English language course for students of intelligent medical systems aims to enhance their communication skills in the medical field. The course focuses on developing their proficiency in reading, writing, and speaking English in an intelligent medical systems context. The primary objectives of the course include improving their ability to understand and communicate complex medical information effectively, preparing them for academic presentations and technical writing, and improving their ability to interact with medical professionals in an English-speaking environment. The outputs of the course include students who are capable of understanding and using medical terminology effectively, as well as writing research papers and presenting their work in English. The course will enable students to function effectively in English-speaking medical environments and contribute to the global growth of intelligent medical systems research.</p>			

Module 13

Code	Course/Module Title	ECTS	Semester
ITC000041	Arabic Language I	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>يتضمن هذا المقرر مادة قرائية بسيطة، تدور حول موضوعات تلبي حاجات الطالب اللغوية المقررة ، وتدريبه على الربط بين رموز الكتابة العربية والمفردات والعبارات الإرشادية والجمل البسيطة ، إضافة إلى فهم دلالات علامات الترقيم الأساسية. وكذلك اشتمل هذا المقرر على مواد قرائية مختارة قصيرة تحتوى على تعبيرات ومفردات وتركيب ميسرة في حدود خبرات الطالب ما درسه من فقرات بهدف الفهم العميق لجميع محتوياتها. ويراعى التحكم في الجانب اللغوي من التركيب والمفردات. كما يتدرّب الطالب على القراءة الصحيحة وإستراتيجياتها من خلال أنشطة متنوعة</p>			

Semester 3

Module 14

Code	Course/Module Title	ECTS	Semester
ITC310090	Object Oriented Programming	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>The Object-Oriented Programming course teaches students the principles and techniques of object-oriented programming. Through lectures, labs, and practical exercises, students learn to design and implement software systems using objects, classes, and their relationships. They gain proficiency in encapsulation, inheritance, and polymorphism, enabling them to create modular and reusable code. By the end of the course, students are equipped with a strong foundation in object-oriented programming and ready to develop efficient and scalable software solutions.</p>			

Module 15

Code	Course/Module Title	ECTS	Semester
ITC310100	Data structures	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>The Data Structures course teaches the students the principles of data structures. This course will focus on data structures and algorithms for manipulating them. Basic algorithms for creating, manipulating and using these structures will also be discussed. In the Theoretical and Practical parts, students will understand the primitive, non-primitive data structures. The aim is to introduce the method of writing and analyzing algorithms. Students will learn how to implement linear data structures like stack, queue, linked list with its types and non-linear data structures like tree. Different types of searching and sorting techniques will also be introduced and will be compared. Students will carry out a number of programming assignments, which will emphasize various aspects of data organization and manipulation process. Also it contains subjects about file organization concepts.</p>			

Module 16

Code	Course/Module Title	ECTS	Semester
ITC310110	Discrete Mathematics	3	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	42
Description			
<p>The purpose of this course is to understand and use (abstract) discrete structures that are backbones of computer science. In particular, this class is meant to introduce logic, proofs, sets, relations, functions, counting, and probability, with an emphasis on applications in computer science. The goal of this course is to build the mathematical foundation for computer science courses such as data structures, algorithms, relational and database theory.</p>			

Module 17

Code	Course/Module Title	ECTS	Semester
ITC310120	Human Diseases for the Health Professions	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>Disease or a disorder is the result of an abnormal change or disturbance in the structure or function of an organ or organ systems. This can be something as minor as a cold or something as serious as cancer. Diseases can either be acute or chronic. Acute diseases are temporary, and the affected person is expected to recover from them. Chronic diseases continue for a long period of time and can sometimes last for the person's entire lifetime. Depending on their causes, diseases can be divided into certain categories including infectious diseases, degenerative diseases, nutritional diseases, metabolic or endocrine diseases, immune diseases, neoplastic diseases, and psychiatric diseases. Early diagnosis and treatment is essential for the best possible outcome in most cases of disease.</p>			

Module 18

Code	Course/Module Title	ECTS	Semester
ITC310130	Operating Systems	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	112
Description			
<p>The aim of the course is to introduce the students to the concepts of operating Systems (OS) as a guide towards understanding their design and implementation as well as their roles in resource management. ▪ To describe the basic organization of computer systems. ▪ To describe the services an operating system provides to users, processes, and other systems. ▪ To discuss the various ways of structuring an operating system. ▪ To introduce the notion of a process and a thread. ▪ To introduce CPU scheduling, which is the basis for multiprogrammed operating systems. ▪ To develop a description of deadlocks. Finally, to provide a detailed description of various ways of organizing memory hardware.</p>			

Module 19

Code	Course/Module Title	ECTS	Semester
ITC000010	Crimes of the Baath Regime in Iraq	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>لقد شهدت فترة حكم حزب البعث على ارتكاب العديد من الجرائم منذ توقيع الحزب للسلطة عام ١٩٦٨ ولغاية ٢٠٠٣ وقد تنوّعت الانتهاكات التي مارسها النظام بين القتل والقمع وانتهاك الحريات العامة واسقاط الجنسية وادخال العراق في حروب وأزمات إقليمية والتي انعكست اثارها على الشعب وقد لجأ حزب البعث إلى سلوكيات قمعية وافتعل جملة من الظواهر والاليات بهدف احداث تغييرات في بنية المجتمع العراقي ومنذ ان استولى حزب البعث على السلطة عبأ امكاناته لضرب الحركة الاسلامية في العراق وقام بقتل العلماء ورجال الدين ومحظوظ الاحزاب الاسلامية وان الانتهاكات لم تنتهي عند هذا الحد بل تجاوزت ايضا على البيئة مسببا في ارتفاع نسبة التلوث وما صاحبها من اختلال كبير في التوازن البيئي وذلك من خلال استعماله الاسلحة المحرمة دوليا في قصف عدة مدن ومنها حلبجة واتباعه احدى الطرق البشعية في تدمير البيئة وهي سياسة الارض المحروقة لتدمير بيته العراق بحرق ابار النفط وتجميف الاهوار بالإضافة الى قصف المدن العراقية وتم اسقاط النظام في سنة ٢٠٠٣ مما الزم على الحكومة العراقية على ايجاد معالجات لتلك الانتهاكات الخطيرة التي عانى منها الشعب وانصاف الضحايا وذويهم وضمان حقوقهم عن طريق انظمة العدالة الانتقالية</p>			

Semester 4

Module 20

Code	Course/Module Title	ECTS	Semester
ITC310140	Biochemistry	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>Biochemistry is introduced to the basic principles and concepts of the field. The instructor begins by discussing the importance of biochemistry in understanding the chemical basis of life processes. They provide an overview of the major biomolecules, including proteins, nucleic acids, carbohydrates, and lipids, emphasizing their structures, functions, and roles in biological systems. Students learn about the basics of enzyme kinetics, including enzyme-substrate interactions and the factors that affect enzymatic activity. The class may also touch upon metabolism and the concept of energy transformation in living organisms. Throughout the students are encouraged to ask questions, participate in discussions, and begin building a solid foundation in biochemistry.</p>			

Module 21

Code	Course/Module Title	ECTS	Semester
ITC310150	Bioinformatics	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>Bioinformatics, as related to genetics and genomics, is a scientific subdiscipline that involves using computer technology to collect, store, analyze and disseminate biological data and information, such as DNA and amino acid sequences or annotations about those sequences.</p>			

Module 22

Code	Course/Module Title	ECTS	Semester
ITC310160	Database Systems	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>This course presents the fundamental concepts of database design and use. It provides a study of data models, data description languages, and query facilities including relational algebra and SQL, data normalization, transactions and their properties, physical data organization and indexing, security issues and object databases. It also looks at the new trends in databases, for example, Big Data, MapReduce, and NoSQL. The knowledge of the above topics will be applied in the design and implementation of a database application using a target database management system as part of a semester-long group project. Microsoft SQL Server is the main program that will be used to implement and execute SQL queries in this course. Microsoft SQL Server is one of the best relational database management systems that stores and retrieves data as requested by other software applications on the same computer or a remote computer using client-server model.</p>			

Module 23

Code	Course/Module Title	ECTS	Semester
ITC310170	Statistics and Probability	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
<p>Emphasize the knowledge and skill required to efficiently discharge the duties and responsibilities of the medical information. This course deals with the concept of basic theoretical and application of statistics in a medical field. After completion this course most student able to practice dealing with bioinformation and its application.</p>			

Module 24

Code	Course/Module Title	ECTS	Semester
ITC310180	Data Science Ethics	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>The course provides a framework to analyze the ethical considerations as you examine the ethical and privacy implications of collecting and managing big data. Explore the broader impact of the data science field on modern society and the principles of fairness, accountability and transparency as you gain a deeper understanding of the importance of a shared set of ethical values. You will examine the need for voluntary disclosure when leveraging metadata to inform basic algorithms and/or complex artificial intelligence systems while also learning best practices for responsible data management, understanding the significance of the Fair Information Practices Principles Act and the laws concerning the "right to be forgotten. This course will help you answer questions such as who owns data, how do we value privacy, how to receive informed consent and what it means to be fair.</p>			

Module 25

Code	Course/Module Title	ECTS	Semester
ITC000032	English Language II	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>The English language course for students of intelligent medical systems aims to equip learners with strong language skills and technical vocabulary, enabling them to effectively communicate, collaborate, and contribute to the ever-evolving field of healthcare. By achieving these objectives, students will emerge as competent professionals capable of harnessing the potential of smart medical systems to improve patient care and promote innovation in the healthcare industry.</p> <p>Objectives:</p> <ol style="list-style-type: none"> 1. Communication Skills: The primary objective is to develop proficient English speaking, listening, reading, and writing skills. 2. Technical Vocabulary: The course aims to enhance students' knowledge of medical technological concepts. 3. Academic Writing: Developing academic writing skills allows students to produce clear and coherent reports and research papers. <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Enhanced Language Proficiency: Students will demonstrate fluency, accuracy, and confidence in English, enabling them to engage in conversations and presentations. 			

2. Technical Communication: Graduates will possess a solid command of medical and technological vocabulary, facilitating effective communication with the medical environment.
 3. Research Capabilities: The course will provide students with the language skills that will enable them to contribute to the research in intelligent medical systems.

Module 26

Code	Course/Module Title	ECTS	Semester
ITC000042	Arabic Language II	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			

Semester 5

Module 27

Code	Course/Module Title	ECTS	Semester
ITC310190	Artificial Intelligence	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			

This is an introductory course on Artificial Intelligence. The topics may include: AI methodology and fundamentals; intelligent agents; search algorithms; game playing; machine learning; uncertainty and probability theory; probabilistic reasoning in AI; Bayesian networks; decision making, and reinforcement learning. Several assignments will be given to enable the student to gain practical experience in using these techniques.

Module 28

Code	Course/Module Title	ECTS	Semester
ITC310200	Image Processing	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Image processing is the process of transforming an image into a digital form and performing certain operations to get some useful information from it. The image processing system usually treats all images as 2D signals. digital image processing techniques including representation, sampling and quantization, image acquisition, imaging geometry, image transforms, image enhancement, image smoothing and sharpening, and image restoration. More advanced topics include degradation models, image filtering, color image processing, and image segmentation. Modern and different technologies and algorithms in image processing and their applications will be introduced.</p>			

Module 29

Code	Course/Module Title	ECTS	Semester
ITC310210	Geographical Information Systems	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>A Geographic Information System (GIS) is a computer system that analyzes and displays geographically referenced information. It uses data that is attached to a location and draws a Map. Most of the information we have about our world contains a location reference, for example by knowing the geographic location using a specific data, GIS analysis of data locations, elevations, and rainfall will show which streams are likely to carry that fertilizer downstream. or analysis of earthquakes or tsunami etc.... These are just a few examples of the many uses of GIS in earth sciences, biology, resource management, and many other fields.</p>			

Module 30

Code	Course/Module Title	ECTS	Semester
ITC310220	Applications Development	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>We are looking for a dedicated application developer to work with customers to develop new software applications and update and modify existing applications. The application developer processes users' needs to customize the software for computer programs, designs prototype applications, implements, and tests source code and troubleshoots software applications. To be successful as an application developer, you should have a sound knowledge of software engineering as well as excellent analytical skills. A good application developer studies the consumer market and client needs to develop cutting-edge applications.</p>			

Module 31

Code	Course/Module Title	ECTS	Semester
ITC310230	Software Engineering	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Software engineering is a discipline that involves the application of engineering principles and practices to the design, development, and maintenance of software systems. It encompasses a systematic and structured approach to creating software, focusing on delivering high-quality, reliable, and efficient solutions.</p> <p>Software engineers use their knowledge of computer science, mathematics, and engineering principles to analyze user requirements and design software architectures that meet those needs. They employ various methodologies, such as waterfall or agile, to guide the development process and ensure efficient collaboration with stakeholders.</p> <p>The process of software engineering typically involves several stages. Requirements gathering involves understanding the needs and expectations of users and stakeholders, and documenting them in a clear and concise manner. Software design involves creating a blueprint or plan that outlines the structure and behavior of the software, including its modules, components, and interactions.</p>			

Module 32

Code	Course/Module Title	ECTS	Semester
ITC310240	Computer Networks	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>This module will provide students with an overview of the concepts and fundamentals of data communications and computer networks. And it will explain data communication concepts and techniques in a layered network architecture.</p> <p>the student will recognize the network communications, types of communication, network congestion, network topologies, network configuration and Management. and also Explaining in detail about the layered network models (OSI reference model, TCP/IP networking architecture) and their protocols. This will help the student to understand the fundamental concepts of computer networking and Familiarize the student with the basic taxonomy and terminology of the computer networking area. The module will Introduce the student to advanced networking concepts, prepare the student for entry Advanced courses in computer networking, Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.</p>			

Semester 6

Module 33

Code	Course/Module Title	ECTS	Semester
ITC310250	Web Development	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>This course offers an in-depth exploration of various topics in web development. Throughout the course, the topics are carefully selected to align with the current state of stable and widely accepted web technologies, placing a strong emphasis on open-source solutions. The course covers both client-side and server-side technologies, focusing on the concepts and techniques that facilitate efficient web development. By the end of this course, students will gain confidence in creating, coding, and publishing basic HTML and CSS files on the internet. Additionally, students will develop a historical understanding of the web's evolution and acquire knowledge of key industry-standard design guidelines to establish a compelling online presence. Throughout the course, students will apply their foundational knowledge of website creation to plan, design, and develop web pages. The course actively encourages critical thinking through class interactions, projects, and online discussions.</p>			

Module 34

Code	Course/Module Title	ECTS	Semester
ITC310260	Machine Learning	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Machine Learning is a branch of Artificial Intelligence which focuses on the design of intelligent algorithms that enable a computer to learn concepts and make decisions without being explicitly programmed. These algorithms are capable of recognizing and extracting key patterns and structures in data to enable reasoning and making data-driven decisions without human involvement. Machine Learning is extensively used in our day-to-day life without even being aware of it. Few such Machine Learning driven systems include Google Search refining and customizing results, friends and products recommendation on social media, fare prediction when booking a taxi, virtual assistants such as Alexa, Siri and Google Now that learn our personal information and provide us customized service. Machine Learning has been a crucial component of our modern world which is helping a number of engineering and other industries such as manufacturing, robotics and automation, self-driving vehicle technology, healthcare, financial services, retail etc.</p>			

Module 35

Code	Course/Module Title	ECTS	Semester
ITC310270	Computer vision	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Computer Vision is one of the most exciting fields in Machine Learning and AI. It has applications in many industries, such as self-driving cars, robotics, augmented reality, and much more. In this beginner-friendly course, you will understand computer vision and learn about its various applications across many industries. As part of this course, you will utilize Python and Matlab for basic image processing and perform image classification and object detection. This is a hands-on course and involves several labs and exercises. Labs will combine Jupyter Labs and Computer Vision Learning Studio (CV Studio), a free learning tool for computer vision. At the end of the course, you will create your own computer vision web app and deploy it to the Cloud.</p>			

Module 36

Code	Course/Module Title	ECTS	Semester
ITC310280	Embedded Systems	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>This course gives an overview of the principles underlying the design and analysis of embedded systems, software systems that interact with the physical environment typically to control the behavior of physical devices. This kind of software can be found in a rapidly increasing variety of commercial products, from smart appliances to medical devices to automobiles. An understanding of embedded computation focuses on the continuous dynamics of the physical world; the reactive nature of the interaction of embedded software with its physical environment; the different ways system components communicate and cooperate; and system requirements concerning safety, timeliness, stability, and performance. The development of techniques and tools to approach the design, analysis, and implementation of embedded systems in a principled way is an active area of research. The course seeks to give students a coherent introduction to this emerging field.</p>			

Module 37

Code	Course/Module Title	ECTS	Semester
ITC310290	Mobile Applications	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Across the globe, more people are using mobile devices, which are increasingly user-friendly and intuitive, as their primary means of obtaining information and requesting services over the Internet.</p> <p>Most enterprises realize that the users of their business applications have shifted from traditional personal computers (desktops and laptops) to mobile devices (smart phones and tablets). This applies whether the intended user for the application is a direct customer, employee, or business partner.</p>			

Module 38

Code	Course/Module Title	ECTS	Semester
ITC310300	Wireless Sensor Networks	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>A wireless sensor network (WSN) is a network of interconnected sensors that communicate wirelessly to collect and exchange data from the surrounding environment. These networks typically consist of small, low-power devices called sensor nodes that are equipped with various types of sensors, such as temperature sensors, humidity sensors, light sensors, motion sensors, and more. The nodes are distributed throughout a geographic area or an infrastructure, forming a network that enables data gathering and sharing. Wireless sensor network characteristics and components Sensor Nodes: These are the basic building blocks of a WSN. Wireless Communication: Sensor nodes communicate with each other and with a central node, known as the base station or sink node, using wireless communication protocols, such as Wi-Fi Data Collection: Sensor nodes collect data from their surroundings based on the sensors they are equipped with. There are other characteristics such as, Data Routing, Applications, Challenges.</p>			

Semester 7

Module 39

Code	Course/Module Title	ECTS	Semester
ITC310310	Cloud Computing	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>This course can be the definitive resource for persons working in this field as researchers, scientists, programmers, engineers, and users. The course is intended for a wide variety of people including academicians, designers, developers, educators, engineers, practitioners, researchers, and graduate students. With the dramatic growth of cloud computing technologies, platforms, and services in all fields also the virtual machines, containers ...etc.</p>			

Module 40

Code	Course/Module Title	ECTS	Semester
ITC310320	Data Mining	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Data mining is a process of extracting, from a large amount of data, interesting patterns that are non-trivial, hidden, new and potentially useful. It is a rapidly growing field and is becoming important because with the increasing quantity and variety of online data collections by many organizations and commercial enterprises, there is a high potential value of patterns discovered in those collections. This module looks at different data mining techniques and gives you the chance to use a state-of-the-art data-mining tool and evaluate the quality of the discovered knowledge. The topics include: introduction to data mining and knowledge discovery process, data description, data pre-processing, attribute selection, market basket analysis and association rules, classification, clustering, outlier detection, post-processing, social impact and trend of clinical data mining.</p>			

Module 41

Code	Course/Module Title	ECTS	Semester
ITC310330	Electronic Health Records	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Electronic Health Records (EHRs) are digitized documents of health records of individuals. EHRs include electronically created attending Physician Statements (APSs), information about a patient's medical history, diagnoses, medications, vaccination schedules, allergies, radiographs, lab and test results. Provides access to evidence-based tools that providers can use in making decisions about patient care and health insurance. EHRs are governed by a strict government privacy law, the Health Insurance Portability and Accountability Act (HIPAA). This course presents the use of an integrated medical practice management and electronic health record system (PM/EHR) in a medical office setting. Students first learn the conceptual framework both for medical billing and for the use of electronic health records in medical documentation and patient management. Then by working through exercises of increasing difficulty that simulate use of a PM/EHR, students develop transferable skills needed to manage the required software tasks. This course enables students to understand in depth the analysis of electronic health records workflows and the meaningful use of electronic health records and healthcare data systems; Design and implement a health care database and practices using electronic health records data using the latest version of the SQL server management studio, and understand the legal and regulatory issues that shape the development of electronic health records.</p>			

Module 42

Code	Course/Module Title	ECTS	Semester
ITC310340	Deep Learning	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Deep Learning is the go-to technique for many applications, from natural language processing to biomedical. Deep learning can handle many different types of data such as images, texts, voice/sound, graphs and so on. This course will cover the basics of DL including how to build and train multilayer perceptron, convolutional neural networks (CNNs), recurrent neural networks (RNNs), autoencoders (AE) and generative adversarial networks (GANs). The course includes several hands-on projects, including cancer detection with CNNs, RNNs on disaster tweets, and generating dog images with GANs. Prior coding or scripting knowledge is required. We will be utilizing Python extensively throughout the course.</p>			

Module 43

Code	Course/Module Title	ECTS	Semester
ITC310350	Simulation and Modeling in Medical Applications	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>The Simulation and Modeling course provides students with a comprehensive understanding of simulation techniques and modeling principles. Through a combination of theoretical knowledge and practical application, students learn how to create accurate models that represent real-world phenomena and use simulation software tools to analyze and interpret simulation results.</p> <p>The course covers a wide range of topics, including types of simulation techniques such as discrete-event simulation, continuous simulation, agent-based modeling, and system dynamics. Students explore the process of model development, including system identification, parameterization, and validation. They also gain experience in designing simulation experiments, conducting sensitivity analysis, and evaluating simulation outcomes.</p>			

Module 44

Code	Course/Module Title	ECTS	Semester
ITC310361	Final Project I	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	32	93
Description			
<p>The student must submit a project as part of the requirements for obtaining a bachelor's degree in intelligent medical systems. Work on the project begins at the beginning of the seventh semester, and the student learns the methods and principles of scientific research through scheduled meetings with the supervisor. In this semester, the method of finding references is explained through effective scientific research on reliable academic websites. Introduce the student to the general framework of the project and complete the practical part of the project.</p>			

Semester 8

Module 45

Code	Course/Module Title	ECTS	Semester
ITC310370	Big Data Analysis	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>In this course, you will be introduced to many of the core concepts of big data. You will learn about the primary systems used in big data. We'll go through phases of a common big data life cycle. This course covers a wide variety of topics that are critical for understanding big data and are designed to give you an introduction and overview as you begin to build relevant knowledge and skills.</p>			

Module 46

Code	Course/Module Title	ECTS	Semester
ITC310380	Information security	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>This course covers information security principles, an area of study that engages in protecting the confidentiality, integrity, and availability of information. Information security continues to grow with advancements in technology – as technology advances, so do threats, attacks, and our efforts to mitigate them. In this course, we discuss the modes of threats and attacks on information systems. We also discuss an important area of threat mitigation that saw rapid development in the twentieth century: cryptography. Information security is concerned with user identification and authentication and access control based on individual or group privileges. The basic access control models and the fundamentals of identification and authentication methods are included in this course.</p>			

Module 47

Code	Course/Module Title	ECTS	Semester
ITC310390	Health Care Systems Administration	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>This course is designed to help students understand healthcare systems, ethical and legal healthcare issues, management functions, leadership styles, and healthcare marketing concepts. Demonstrate new skills through the use of materials, tools, and/or technology that are central to healthcare management. The course covers significant laws and ethics of healthcare management and administers basic management skills and fosters productive team environments. Additionally, students will develop and analyze strategic Integrate management theory and evidence-based solutions with real-world situations.</p>			

Module 48

Code	Course/Module Title	ECTS	Semester
ITC310400	Human and Computer Interaction	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>This course investigates theory and practice in Human-Computer Interaction. It addresses the human, machine, social, aesthetic and economic constraints in designing interactive computer systems. students will study the impact of human perception and cognition on user interface (GUIs). in addition, each student will design and implement a user interface</p>			

Module 49

Code	Course/Module Title	ECTS	Semester
ITC310410	Medical Multimedia	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>The Medical Multimedia course using Blender 3D provides students with the knowledge and skills to create engaging and informative multimedia content for healthcare applications. Through a combination of theoretical learning and practical hands-on experience, students will explore the use of Blender 3D, a powerful 3D modeling and animation software, in the context of medical multimedia.</p> <p>The course covers various aspects of Blender 3D, including modeling, texturing, animation, rendering, and virtual reality. Students will learn to create accurate and visually appealing 3D models of medical objects, animate medical processes and procedures, and design virtual reality environments for patient education and training.</p> <p>By the end of the course, students will have developed a solid foundation in using Blender 3D for medical multimedia projects. They will be equipped with the skills to effectively communicate complex medical information through interactive and immersive multimedia experiences.</p>			

Module 50

Code	Course/Module Title	ECTS	Semester
ITC310362	Final Project II	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	32	93
Description			
In the last semester, the student must complete the theoretical part of the final project based on what he has accomplished from the practical side. The student shall undergo an oral exam by the Scientific Committee to assess what the student has accomplished, the method of defense and his answer to the questions of the examiners.			

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