**CENTRAL UNIVERSITY**

**FACULTY OF ENGINEERING**

**DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY**

**SECOND SEMESTER 2024/2025 ACADEMIC YEAR**

**COURSE OUTLINE**

**Course: ITEC402: Multimedia Computing Credits: 3**

**Lecturer: Name: Bright S.K. Anibrika Mobile: 0544032589**

**Office: Computer Sci & I.T Dept. Block C 0208560460**

**Email:** [**skbselorm7@gmail.com**](mailto:skbselorm7@gmail.com)

**Office Hours: By appointment**

**Course description:**

Students will explore several different ways of expressing themselves digitally by developing and utilizing the elements and principles of visual arts in a world that craves digital media in all career pathways. Topics include Internet multimedia file types, file type conversion, acquisition of digital audio/video, streaming audio/video and graphics animation plug-in programs and other related topics. This second part of the course focuses on the design, development and implementation of interactive media in instructional settings. Students will evaluate current commercial programmes and develop custom applications. Topics include: hypermedia programs, compact disc technologies, digital images, digital audio, digital video and distance education, evaluation of commercial programs and development of customs application using HyperStudio, PowerPoint, Inspiration and the Web.

**Course objectives:**

By the end of the course, students will be able to:

1. Recognize the importance of the operating systems.
2. Recognize how the applications interact with the operating system as the later working as intermediary program between the machine and the application.
3. Know how the operating systems transport the application requests to the hardware.
4. Understand how operating systems managing resources such as processors, memory and I/O.
5. Realize the efficiency or the deficiency of the different techniques used by some operating systems.

**Teaching Approaches:**

There would be formal and online lectures, practical lab work, assignments, reflections and discussions

**Minor Modifications:**

When minor modifications are made to this syllabus, those will be reflected in the online management system.

**Online Learning Materials and Activities:**

You can access all learning materials in the online management system, if you are a registered student. It is very important to participate in learning activities given in the online management system to learn this course

**Assessment:**

There would be two quizzes, two an unannounced quiz and a number of class exercises and assignments. These would constitute 40% of the total scores for the final grade. In addition, there is a final end of semester examination which would constitute 60% of the total scores for the final grade.

**Online Assignments:**

Online assignments, quizzes and other related form of assessment could be conducted on the online management system as well.

**Content:**

|  |  |  |  |  |  |  |  |  |
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| **Unit 1** |  |  | **Introduction to Computers** | | |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Introduction |  |  | Introduction To multimedia system , history and | | | | |  |
|  |  |  | applications |  |  |  |  |  |
| Global structure of | |  | Device domain, system domain, application domain, | | | | |  |
| Multimedia |  |  | cross domain with diagram | |  |  |  |  |
|  | |  |  | | | | |  |
| Multimedia Application | |  | Basic applications of multimedia system in all | | | | |  |
|  |  |  | sectors |  |  |  |  |  |
| Medium |  |  | The perception medium, the representation medium, | | | | |  |
|  |  |  | the presentation medium, the storage medium, the | | | | |  |
|  |  |  | transmission medium, the information exchange | | | | |  |
|  |  |  | medium, representation values and representation | | | | |  |
|  |  |  | spaces, representation dimensions | | |  |  |  |
| Multimedia system and | |  | Combination of media, independence ,computer | | | | |  |
| properties |  |  | support integration | |  |  |  |  |
|  | |  |  | | | | |  |
| Characteristics of a | |  | Multimedia systems must be **computer controlled**, | | | | |  |
| Multimedia System | |  | Multimedia systems are **integrated**, the information | | | | |  |
|  |  |  | they handle must be represented **digitally**, the | | | | |  |
|  |  |  | interface to the final presentation of media is usually | | | | |  |
|  |  |  | **interactive**. |  |  |  |  |  |
|  |  |  |  | | | | |  |
| Challenges for |  |  | Synchronization, Sequencing, Distributed Network, | | | | |  |
| Multimedia Systems | |  | Inter-media Scheduling | |  |  |  |  |
|  | |  |  |  |  |  | |  |
| Components of a | |  | **Capture** | **devices,** | **Storage** | **Devices,** | |  |
| Multimedia System | |  | **Communication Networks, Computer Systems,** | | | | |  |
|  |  |  | **Display Devices,** | |  |  |  |  |
| **Unit 2** |  |  | **Sound / Audio System** | |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Concepts of sound | |  | Frequency, amplitude, Computer representation of | | | | |  |
| system |  |  | sound, sampling rate, quantization, sound hardware | | | | |  |
|  | |  |  |  |  | |  |  |
| Music and speech | |  | Basic MIDI | concepts, | MIDI devices, | | MIDI |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | messages, MIDI and SMPTE timing standards, | | | | | | | | |
|  | MIDI software | | | | | | | | |
| Speech Generation | Basic Notions, Reproduced Speech output, Time | | | | | | | | |
|  | dependent sound concatenation, frequency – | | | | | | | | |
|  | dependent sound concatenation | | | | | | | | |
| Speech Analysis | Research area of speech analysis, speech | | | | | | | | |
|  | recognition, | | | | | | | | |
| Speech Transmission | Signal form coding, source coding in parametrized | | | | | | | | |
|  | systems, recognition and synthesis systems | | | | | | | | |
| **Unit 3** | **Images and Graphics** | | | | | | | | |
|  |  | | | | | | | | |
| Digital Image | Image format, storage image format | | | | | | | | |
| Representation |  | | | | | | | | |
|  |  | | | | | | | | |
| Image and graphics | Introduction about different Image and graphics | | | | | | | | |
| Format | Format | | | | | | | | |
|  |  | | | | | | | | |
| Image Synthesis , | Computer Image processing, dynamics in graphics, | | | | | | | | |
| analysis and | the framework of interactive graphics systems, | | | | | | | | |
| Transmission | Graphics input/ output hardware, dithering, image | | | | | | | | |
|  | analysis, Image recognition, Image recognition | | | | | | | | |
|  | steps, Image transmission | | | | | | | | |
| **Unit 4** | **Video and Animation** | | | | | | | | |
|  |  | | | | | | | | |
| Video signal | Visual representation, Transmission, digitalization, | | | | | | | | |
| representation |  | | | | | | | | |
|  |  | | | | | | | | |
| Computer Video Format | Introduction to Computer video format | | | | | | | | |
|  |  | | | | | | | | |
| Computer- Based | Input process, composition stage, in between process, | | | | | | | | |
| animation | Changing colours, | | | | | | | | |
|  |  | | | | | | | | |
| Animation Language | Linear list notations, General purpose language, | | | | | | | | |
|  | Graphical Languages, | | | | | | | | |
| Methods of controlling | Full explicit control, procedural control, constraint | | | | | | | | |
| Animation | based systems, tracking live action, kinematics and | | | | | | | | |
|  | dynamics, | | | | | | | | |
| Display of Animation | Basic knowledge about Display of Animation | | | | | | | | |
|  |  | | | | | | | | |
| Transmission of | Basic knowledge about Transmission of Animation | | | | | | | | |
| Animation |  | | | | | | | | |
|  |  | | | | | | | | |
| **Unit 5** | **Data Compression** | | | | | | | | |
|  |  | | | | | | | | |
| Storage Space | Basic knowledge about Storage Space | | | | | | | | |
|  |  | | | | | | | | |
| Coding Requirements | Basic knowledge about Coding Requirements | | | | | | | | |
|  |  | | | | | | | | |
| Source, Entropy and | Entropy coding, source coding- Huffman Encoding, | | | | | | | | |
| Hybrid Coding |  | | | | | | | | |
|  | Arithmetic encoding (introduction only), Run length | | | | | | | | |
|  | encoding, |  |  |  |  |  |  |  |  |
| Lossy Sequential DCT- | Steps of Lossy Sequential DCT- based Mode | | | | | | | |  |
| based Mode |  |  |  |  |  |  |  |  |  |
|  |  | | | | | | | |  |
| Expanded Lossy DCT- | Steps of Expanded Lossy DCT-based Mode | | | | | | | |  |
| based Mode |  |  |  |  |  |  |  |  |  |
|  |  | | | | | | |  |  |
| JPEG and MPEG | JPEG and MPEG compression process | | | | | | |  |  |
|  |  | |  |  |  |  |  |  |  |
| **Unit 6** | **User Interfaces** | |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Basic Design Issues | Architectural issues, information characteristics for | | | | | | | | |
|  | presentation, | | presentation | | | function, | | presentation | |
|  | design knowledge, effective human computer | | | | | | | | |
|  | interaction | |  |  |  |  |  |  |  |
| Video and Audio at the | Classification of software: system software and | | | | | | | | |
| User Interface | application software, audio and | | | | | | video at the user | | |
|  | interface |  |  |  |  |  |  |  |  |
| User- friendliness as the | Easy to learn instruction, presentation, Dialogue | | | | | | | | |
| Primary Goal | boxes, additional design criteria, design specific | | | | | | | | |
|  | criteria |  |  |  |  |  |  |  |  |
| **Unit 7** | **Multimedia Application** | | | |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Media preparation and | Means, video support, scanner devices, recognition | | | | | | | | |
| composition | devices, tracking devices, motion based devices, | | | | | | | | |
|  |  | | | | | | | | |
| Media integration and | Multimedia editors, Hypermedia/ Hypertext editors, | | | | | | | | |
| communication | authoring tools, tele-services, interactive services, | | | | | | | | |
|  | Distributed services, Media Consumtion | | | | | | | |  |
| Media Entertainment | Virtual Reality, Interactive video, Interactive audio, | | | | | | | | |
|  | Games | | | | | | | | |
| Telemedicine | Application of Telemedicine in Multimedia | | | | | | | | |
|  |  | | | | | | | | |
| E-learning | Application of e-Learning in Multimedia | | | | | | | | |
|  |  | | | | | | | | |
| Digital video editing and | Application of in Digital video editing and production | | | | | | | | |
| production systems | systems in Multimedia | | | | | | | | |
|  |  | | | | | | | | |
| Video conferencing | Application of Video conferencing | | | | | | | | |
|  | in Multimedia | | | | | | | | |
|  |  | | | | | | | | |
| Video-on-demand | Application of Video-on-demand | | | | | | | | |
|  | in Multimedia | | | | | | | | |
|  |  | | | | | | | | |

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