UNIVERSITAS BAKRIE

Syllabus – Multimedia Systems

Kode Mata Kuliah (*Course Code*): **TIF311**	**Nama Mata Kuliah** (*Course Name*): **Multimedia Systems**
Program Studi (*Study Program*): **Informatics**	**Fakultas** (*Faculty*): **Engineering and Computer Science**
Mata Kuliah Pra-Syarat (*Course Pre-requisite*): **TIF208 - Digital Signal Processing**	**Kredit** (*Credit*): **3**

Kuliah (*Lecture*): **3**	**Tutorial**: **0**	**Praktikum** (*Practicum*): **0**

Revisi (*Revision Status*): **2.0**	**Semester**: Ganjil/Odd **Tahun Akademik**: 2015/2016

Lecturer's Name:
Irwan Prasetya Gunawan

COURSE DESCRIPTION

This course introduces the students the followings:

- Broad grounding in issue surrounding multimedia,
    - role of multimedia Systems
    - design of multimedia Systems
    - Multimedia data — digital audio, graphics and video, etc
- underlying concepts and representations of sound, pictures and video,
- data compression and transmission,
- integration of media,
- delivery of multimedia.
- Applications

COURSE OBJECTIVES

Upon completion of this course, the student should be able to:

- Understand the relevance and underlying infrastructure of the multimedia systems.
- Understand core multimedia technologies and standards (Digital Audio, Graphics, Video, VR, data transmission/compression)
- Be aware of factors involved in multimedia systems performance, integration and evaluation

Topics in the module include the following:

- Introduction: Multimedia applications and requirements (e.g., overview of multimedia systems, video-on-demand, interactive television, video conferencing, hypermedia courseware, groupware, World Wide Web, and digital libraries).
- Audio/Video fundamentals including analog and digital representations, human perception, and audio/video equipment, applications.
- Audio and video compression
    - perceptual transform coders for images/video (e.g., JPEG, MPEG, H.263, etc.),
    - scalable coders (e.g., pyramid coders),
    - perceptual audio encoders.
    - Image and video processing applications and algorithms.
- Multimedia hardware and software including computer architecture and devices, OS support, network protocols, multicast networks (MBONE), continuous media system services and toolkits, and digital media servers and storage systems.
- Advanced Multimedia: Virtual Reality, Augmented Reality, Multimedia databases/digital libraries
- Multimedia systems: Case Studies (e.g., paper, research, simulated environments, documents, etc.).

Syllabus – MULTIMEDIA SYSTEMS

METHODS OF INSTRUCTIONS

Classroom instruction consists of lectures and practical problem solving, supplemented by visual aids designed to assist the student to successfully meet the courses learning objectives.

It is imperative that students take an active interest in the course. To succeed in this course, students must read, think, and write in a critical and analytical manner and this takes time and practice. Such practice can only be achieved by working theoretical and practical exercises. When troubles arise, and they will, the student must ask questions which may be directed to the instructor or other students in a variety of ways.

Students are also encouraged to work together on problem sets as part of their exercises. However, individual must ultimately demonstrate the understanding of the material by writing up his/her own solutions without the help of other students or their written work.

On average students need to spend, at least, 6 hours of study and preparation per week for this course.

ATTENDANCE REQUIREMENT

Comply with academic rules. Punctuality and regular attendance in classes is of prime importance for successful completion of this course. Students will be expected to arrive for class on time and to remain in class until the end of the class session.

Absence from lectures shall not exceed 22%. Students who exceed the 22% limit without a medical or emergency excuse acceptable to and approved by the Dean of the Faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course.

ASSESSMENT

Coursework evaluation will be weighted as follows:

- Mid Semester Test: 20%
- Final Semester Test: 30%
- Assignments/Quiz: 20%
- Presentations: 20%
- Class participation: 10%

MATERIAL REFERENCES AND REQUIRED SUPPLIES

Prescribed Textbooks:

[1] Ze-Nian Li, Mark S. Drew, Fundamentals of Multimedia, Prentice-Hall, 2004

Additional sources:

[2] Yao Wang, Jorn Ostermann, Ya-Qin Zhang, Video Processing and Communications", Prentice Hall, 2002

[3] K. Rao, A. Bojkovic and D. Milovanovic, Introduction to Multimedia Communication: Application, Middleware & Networking, Wiley Intersc. Publisher, 2006

COURSE OUTLINE

Session	Topics & Sub-Topics	Methods	References	Assignment
1	Introduction: (a) Introduction to the terminology and description of informatics and multimedia (b) Components of multimedia (c) Hypermedia (d) WWW (e) Research topics in multimedia informatics	Lecture, Discussion	[1] Chapter 1	Probs: 3, 4, 5, 6
2	Audio processing: (a) Human auditory system (b) Sampling (c) Digitization of sound (d) Quality measurement of audio signals	Lecture, Discussion	[1] Chapter 6	Probs: 1, 6, 9, 10

3	Audio compression: (a) CD Audio (b) Basic PCM (Pulse Code Modulation) (c) Adaptive PCM (d) Perceptual coding (e) MPEG Audio	Lecture, Discussion	[1] Chapter 6, 13, and 14	Probs: 6.13-14, 13.5, 14.4, 14.8
4	Fundamental mechanism of Human Visual System: (a) Structure of the human eye (b) Image formation in the eye (c) Brightness adaptation and discrimination (d) Contrast (e) Masking	Lecture, Discussion	[1] Chapter 4.1	Probs: 1, 2, 5, 6, 7
5	Image/Video Data Representations: (a) Image data types (b) File formats to represent images (c) Various types of video signals (d) Analog video (e) Digital video	Lecture, Discussion	[1] Chapter 3.1-2, 5.1-3	Probs: 3.1, 3.3, 5.1, 5.3, 5.4, 5.6, 5.10
6	Basic data compression: (a) Lossless compression algorithm (b) RLC, VLC (c) Huffman coding, arithmetic coding (d) Lossy compression algorithms (e) Rate distortion theory (f) Quantization (g) Transform coding	Lecture, Discussion	[1] Chapter 7.1-4, 7.6, 8.1-5	Probs: 7.1-3, 7.5-6, 8.4-7
7	Review to go over materials before mid exam and Project Discussions	Discussion, Quiz	Materials before mid-test	Students' Presentation
MID SEMESTER TEST				
8	Image Compression Standards: (a) Image compression basic (b) JPEG Standard (c) JPEG2000 Standard (d) Other image compression standards	Lecture, Discussion	[1]Chapter 9.1-9.2, Paper articles	Probs: 9.1-2, 9.4-6
9	Basic Video Compression Standards: (a) Video compression techniques (b) Motion compensation (c) Methods for searching motion vectors (d) Video coding standards: MPEG 1/2/4 (e) Object based video coding in MPEG4 (f) Video coding standards: H.261, H.263, H.264	Lecture, Discussion	[1] Chapter 10.1-5, 11.2-3, 12.1-4	Probs: 10.{1/3/4/7/8/9}, 11.{1/3/4/5}, 12.{1/3}
10	Advanced Topics in Video Coding: (a) AVC (b) HEVC (c) Watermarking (d) Segmentation (e) Streaming	Discussion	Paper articles	Practical problems / projects
11	Error control: (a) Error Resilience techniques: data partitioning, FEC (b) Error Concealment methods (c) congestion control	Discussion	Paper articles	Practical problems / projects
12	Network Layer Support: (a) Network function to support multimedia system (b) Analyzing network traffic in multimedia systems (c) QoS (d) Access and Core Broadband Network (e) Content Delivery Network	Lecture, Discussion	Chapter 15	Probs: 15.{1/5/6/8/10}

13	Multimedia Networking: (a) Internet protocols to support multimedia networking (b) Multimedia applications over the network (c) RTP, RTCP (d) Audio and video streaming	Lecture, Discussion, Quiz	Chapter 16	Probs: 16.{1/4/5/7/9}
14	Review: (a) Review material for the finals (b) Project presentation (c) Discussion (d) Quiz	Discussion, Quiz	Materials after mid-test	Student' Presentation
	FINAL SEMESTER TEST			

Prepared by:

Name: Irwan Prasetya Gunawan

Position: Lecturer

Date: April 14, 2016

Certified by:

Name: Hoga Saragih

Position: Head of Department

Date