University of Macau
Faculty of Science and Technology
Department of Computer and Information Science
CISB365 Multimedia Computing
Syllabus
2nd Semester 2014/2015
Part A – Course Outline

Elective course in Computer Science

Course description:
(2-2) 3 credits. This course will introduce general principles and techniques in multimedia programming. The main topics will cover multimedia data fundamentals and representation, digital image and drawing creation and modification, audio manipulation and modern music synthesis, animation and video processing. The programming language used in this course will be Java. The goal is to improve the students' insight in multimedia technology and skills on the multimedia programming, which will enable students to develop new and creative ways of using multimedia in the future.

Course type:
Theoretical with substantial laboratory/practice content

Prerequisites:
- CISB110

Textbook(s) and other required material:
- Mark Guzdial and Barbara Ericson. *Introduction to Computing & Programming with Java: A Multimedia Approach*. Pearson Prentice Hall, 2007

References:
- Nigel Chapman and Jenny Chapman, ***Digital Multimedia (Third Edition)***, John Wiley & Sons, Ltd, 2011.
- Radhika S. Grover, ***Programming with Java: A multimedia Approach***, Jones & Bartlett Learning, 2013.

Major prerequisites by topic:
- Fundamental concepts of programming with abstract data types and separate compilation method
- Language proficiency in at least one programming language
- Fundamental algorithmic analysis and design of different programming constructs and data structures

Course objectives:
- Introduce to students the fundamental knowledge and representation for digital picture, sound, video and animation. [a]
- Introduce to students the general principles and techniques of multimedia programming, including how to manipulate the pictures, digital sounds, and movies etc. [a, c]
- Learn the core features, in Java programming languages, that support multimedia representation and processing. [a, c]

Topics covered:
- **Introduction to the fundamental concept of multimedia computing (2 hours)**
- **Introduction of general principles and techniques in image programming (10 hours):**

Introduce the basic knowledge of image representations in computer, the general principles and programming techniques in image color processing, copying and transforming pictures, edge detection, background subtraction, and chromakey, etc.

- **Introduction of general principles and techniques in graphic drawing (4 hours):** Introduce basic programming techniques of graphic drawing in setting the brush, copying pictures by drawing images, general scaling, and blending pictures, etc.
- **Introduction of general principles and techniques in sound manipulating (6 hours):** Introduce the basic knowledge of sound coding in computer, the general principles and programming techniques in changing the volume of sounds, normalizing sounds, blending sounds, manipulating different sections of a sound differently, composing sounds through addition, and modern music synthesis, etc.
- **Introduction of general principles and techniques in animation processing (2 hours):** Introduce the basic knowledge and programming techniques in frame-based animation creation, including one object and multi-objects moving at once, background color changing, and frame slow fading out, etc.
- **Introduction of general principles and techniques in video programming (2 hours):** Introduce the basic knowledge and programming techniques in video editing, including encoding, manipulating video frames, blending animation and video frames, and chromakey processing, etc.
- **Final project presentation (2 hours).**

Class/laboratory schedule:

Timetabled work in hours per week			No of teaching weeks	Total hours	Total credits	No/Duration of Mid-term exam	No/Duration of final exam
Lecture	Tutorial	Practice					
2	2	Nil	14	56	3	2 hours	3 hours

Student study effort required:

Class contact:	
Lecture	28 hours
Tutorial	28 hours
Other study effort	
Self-study	28 hours
Homework assignment	12 hours
Project	12 hours
Total student study effort	108 hours

Student assessment:

Final assessment will be determined on the basis of:

Assignment	20%	Lab exercises and reports	10%
Project	20%	Mid-term Exam	20%
Final exam	30%		

Course assessment:

The assessment of course objectives will be determined on the basis of:

- Homework, project and exams
- Course evaluation

Course outline:

Weeks	Topic	Course work
1	**Introduction to the fundamental concept of media computation**	

Weeks	Topic	Course work
2-4	**Introduction of general principles and techniques in picture programming** Java based picture manipulation, including modifying pictures using loop, modifying pixels in a matrix, edge detection and drawing, etc.	1. Assignment 1 2. Lab exercises 1-3
5-6	**Introduction of general principles and techniques in graphic drawing** Java based graphic drawing, including setting the brush, copying pictures by drawing images, general scaling, and blending pictures, etc.	Lab exercises 4, 5
7-9	**Introduction of creating and modifying text for web** Java based text modification for web, including creating and modifying text, making text for the web, writing programs to general HTML, using a database to build web pages, and handling the text for the web, etc.	Project
10-11	**Introduction of general principles and techniques in sound manipulation** Java based sound manipulation, including sound encoded, changing the volume of sounds, normalizing sounds, manipulating different sections of sound differently, blending sounds, creating an echo, and additive synthesis, etc.	1. Assignment 2 2. Lab exercises 8,9
12-13	**Introduction of general principles and techniques in movie programming** Java based movie manipulation, including generating frame-based animations, working with video frames, encoding and manipulating movies, etc.	Lab exercise 10
14	**Project Presentation**	

Contribution of course to meet the professional component:
This course prepares students to work professionally in the area of multimedia programming.

Relationship to CS program objectives and outcomes:
This course primarily contributes to the Computer Science program outcomes that develop student abilities to:
(a) an ability to apply knowledge of computing, mathematics, science, and engineering.
(c)an ability to analyse a problem, and identify and define the computing requirements appropriate to its solution;

Relationship to CS program criteria:

Criterion	DS	PF	AL	AR	OS	NC	PL	HC	GV	IS	IM	SP	SE	CN
Scale: 1 (highest) to 4 (lowest)		3	4	1			2							

Discrete Structures (DS), Programming Fundamentals (PF), Algorithms and Complexity (AL), Architecture and Organization (AR), Operating Systems (OS), Net-Centric Computing (NC), Programming Languages (PL), Human-Computer Interaction (HC), Graphics and Visual Computing (GV), Intelligent Systems (IS), Information Management (IM), Social and Professional Issues (SP), Software Engineering (SE), Computational Science (CN).

Course content distribution:

Percentage content for			
Mathematics	Science and engineering subjects	Complementary electives	**Total**
0%	100%	0%	100%

Persons who prepared this description:
Dr. Li Ming Zhang

Part B – General Course Information and Policies

2nd Semester 2014/2015

Instructor: Dr. Liming Zhang Office: E11-4016
Office hour: Wed 2:30 pm – 5:30 pm, or by appointment Phone: 8822 8467
Email: lmzhang@umac.mo

Time/Venue: Fri 1100: am – 10:00 pm, (lectures)
Tue 11:00 am – 12:45 pm, (laboratory)

Grading distribution:

Percentage Grade	Final Grade	Percentage Grade	Final Grade
100 - 93	A	92 - 88	A–
87 - 83	B+	82 - 78	B
77 - 73	B–	72 - 68	C+
67 - 63	C	62 - 58	C–
57 - 53	D+	52 - 50	D
below 50	F		

Comment:
The objectives of the lectures are to explain and to supplement the text material. Students are responsible for the assigned material whether or not it is covered in the lecture. Students who wish to succeed in this course should work all assignments, lab exercises and project. Students are encouraged to look at other sources (other texts, etc.) to complement the lectures and text.

Homework policy:
The completion and correction of homework is a powerful learning experience; therefore:

- There will be approximately 2 homework assignments, 3 lab exercises, and 1 project.
- Assignments and project are due four weeks, the lab exercises are due one week unless otherwise noted, late homework will be deducted 10% marks for each delayed day.
- Possible revision of homework grades may be discussed with the grader within one week from the return of the marked homework.

Exams:
One 2-hour mid-term exam will be held during the semester. One 3-hour final exam will be held at the end of semester. Both the mid-term and final exams are close booked examinations.

Note:

- Lab exercise sessions are important part of this course and attendance is strongly recommended.
- Check UMMoodle for announcement, homework and lectures. Report any mistake on your grades within one week after posting.
- No make-up exam is given except for CLEAR medical proof.
- Cheating is absolutely prohibited by the university.

Appendix:

Rubric for Program Outcomes

(a) An ability to apply knowledge of computing and mathematics appropriate to the programme outcomes and to the discipline

(c) An ability to analyse a problem, and identify and define the computing requirements appropriate to its solution

Rubric for (a)	**5 (Excellent)**	**3 (Average)**	**1 (Poor)**
Understand the theoretic background	Students understand theoretic background and the limitations of the respective applications.	Students have some confusion on some background or do not understand theoretic background completely.	Students do not understand the background or do not study at all.
Rubric for (c)	**5 (Excellent)**	**3 (Average)**	**1 (Poor)**
Identify applications in engineering systems	Students understand problem and can identify fundamental formulation.	Students understand problem but cannot apply formulation, or cannot understand problem.	Students cannot identify correct terms for engineering applications.