University of Macau
Department of Electromechanical Engineering
MECH482 - Computer Technology in Engineering
Syllabus
1st Semester 2012/2013
Part A – Course Outline

Required elective course in Electromechanical Engineering

Course description:

The purpose and role of variables, constants, and procedures in application programming, control program execution with decision control and looping structures. Concepts of object-oriented programming (OOP). Application programming.

Prerequisite:

CPTG104 - Computer Science

Textbook:

- None

Reference:

- Herbert Schildt, C++: the complete reference, 4th Edition, McGraw-Hill.

Course objectives:

1. Learn to apply knowledge of computing and mathematics to programming. [a]
2. Learn to design, implement, and evaluate a computer-based system, process, or program to meet desired needs. [c]
3. Acquire abilities to analyze a problem and identify the computing requirements appropriate for its solution. [e]
4. Learn to recognize the need for an ability to engage in continuing professional development. [i]
5. Learn to use current techniques, skills, and tools necessary for computing practice. [l]

Topics covered:

1. **C Language** – Expressions; Statements; Arrays and Null-Terminated Strings; Pointers; Functions; Structures; Enumerations; Console I/O; File I/O; Preprocessor and Comments
2. **C++ Language** – Concept of Object-Oriented Programming; Classes and Objects; References; Dynamic Allocation of Memory; Function Overloading; Constructors; Default Arguments; Operator Overloading; Inheritance; Virtual Functions; Polymorphism; Exception Handling; Console I/O; File I/O; Namespaces
3. **Visual C++** – Dialogs and Controls; Messages and Commands; Documents and Views; Drawing on the Screen; File I/O using MFC; Advanced Drawing Techniques
4. **Basics of MFC OpenGL** – Drawing in 2D Environment, Drawing 3D Objects; 3D Animation; Keyboard and Mouse Control; Lighting Control; Texture Mapping

Class schedule and credits:

Timetabled work in hours per week			No of teaching weeks	Total hours	Total credits	No / Duration of exam papers
Lecture	Tutorial	Practice				
2	2	0	14	56	3.5	1 / 3hrs

Topic Outline:

Week No.	No. of hours	Topics
1, 2, 3	12	**C Language** Expressions; Statements; Arrays and Null-Terminated Strings; Pointers; Functions; Structures; Enumerations; Console I/O; File I/O; Preprocessor and

		Comments
4, 5, 6, 7	16	**C++ Language** Concept of Object-Oriented Programming; Classes and Objects; References; Dynamic Allocation of Memory; Function Overloading; Constructors; Default Arguments; Operator Overloading; Inheritance; Virtual Functions; Polymorphism; Exception Handling; Console I/O; File I/O; Namespaces
8, 9, 10, 11	16	**Visual C++** Dialogs and Controls; Messages and Commands; Documents and Views; Drawing on the Screen; File I/O using MFC; Advanced Drawing Techniques
12, 13, 14	12	**Basics of MFC OpenGL** Drawing in 2D Environment, Drawing 3D Objects; 3D Animation; Keyboard and Mouse Control; Lighting Control; Texture Mapping

Contribution of course to meet the professional component:

This course prepares students to work professionally in the area of **computer science**.

Relationship to EME Programme objectives and outcomes:

This course primarily contributes to Electromechanical Engineering Programme outcomes that develop student abilities to:

(a) an ability to apply knowledge of mathematics, science, and engineering.
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability;
(e) an ability to identify, formulate, and solve engineering problems.
(l) an ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations.

The course secondarily contributes to Electromechanical Engineering Programme outcomes that develop student abilities to:

(i) an ability to recognize the need for, and to engage in life-long learning.

Course content:

Maths	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies	Total 100%
0	0	10	40	0	50	100

Persons who prepared this description:

Mr. Seng Kin Lao

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Part B – General Course Information and Policies

1st Semester 2012/2013

Instructor: Mr. Seng Kin Lao
Office: N327C
Office Hour: By appointment
Phone: (853) 8397-4379
Email: skelton@umac.mo

Time/Venue:

Every Thursday, 11:30 a.m. - 1:30 p.m., Room T103
Every Friday, 2:30 p.m. - 4:30 p.m., Room T104

Assessment:

Final assessment will be determined on the basis of:

Quizzes:	10%
Mid-term:	30%
Final Exam (Comprehensive):	30%
Design Project:	30%

Grading System:

The credit is earned by the achievement of a grade from 'A' to 'D'; 'F' carries zero credit.

Grades are awarded according to the following system:

Letter Grades	Grade Points	Percentage
A	4.0 (Excellent)	93-100
A-	3.7 (Very good)	88-92
B+	3.3	83-87
B	3.0 (Good)	78-82
B-	2.7	73-77
C+	2.3	68-72
C	2.0 (Average)	63-67
C-	1.7	58-62
D+	1.3	53-57
D	1.0 (Pass)	50-52
F	0 (Fail)	Below 50

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 read the assignments prior to the lecture. You are encouraged to look at other sources (other texts, etc.) to complement the lectures and text.

Mid-term Exam:

One mid-term exam will be held during the semester.

Note:

- A student who is absent without applying for leave of absence from a course for more than 20% of its scheduled teaching periods in the aggregate will not be allowed to take the final examination and will receive a failing grade for that course.
- Check UMMoodle (webcourse.umac.mo) for announcement and lectures.
- No make-up exam is give except for CLEAR medical proof.
- No exam is given if you are 15 minutes late in the midterm exam and 30 minutes late in the final exam. Even if you are late in the exam, you must turn in at the due time.
- Cheating is absolutely prohibited by the university.

Appendix - Rubric for Programme Outcomes

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
Use a correct model and formulation correctly	Students choose a model correctly and properly apply correct techniques	Students choose a wrong model sometime, use a wrong formula, or a different technique	Students use a wrong model and wrong formula, or do not know how to model
Compute the problem correctly	Students use correct techniques, analyze the problems, and compute them correctly	Students sometime solve problem mistakenly using wrong techniques	Students do not know how to solve problems or use wrong techniques completely

Rubric for (c)	5 (Excellent)	3 (Average)	1 (Poor)
Design capability and design constraints	Student understands very clearly what needs to be designed and the realistic design constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	Student understands what needs to be designed and the design constraints, but may not fully understand the limitations of the design constraints	Student does not understand what needs to be designed and the design constraints.
Process to meet desired needs	Student understands very clearly the process of the design	Student understands what the needs of the process design, but may not fully understand the limitations of the design constraints	Student does not understand the process.

Rubric for (e)	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.	Students cannot identify correct terms for engineering applications
Modeling, problem formulation and problem solving	Students choose and properly apply the correct techniques	Students model correctly but cannot select proper technique or model incorrectly but solve correctly accordingly	Students at loss as to how to solve a problem

Rubric for (i)	5 (Excellent)	3 (Average)	1 (Poor)
Research/ Gathering Information	Comprehensive collection of information on a subject, including state-of-the-art and background	Collects adequate information on a subject	Collects minimal information on a subject
Analysis/ Evaluation	Detailed analysis accounting for all the information, conclusions are well supported	Some analysis done but somewhat shallow; some supporting evidence	Analysis simply involves restating gathered information; claims not supported by evidence

Rubric for (l)	5 (Excellent)	3 (Average)	1 (Poor)
Use modern computer and software tools in engineering practice	Student uses the computer and software to correctly analyze engineering problems and/or create engineering designs, and understands the limitations of the software.	Student uses the computer and software to correctly analyze engineering problems and/or create engineering designs.	Student does not use the computer and software to correctly create engineering designs and/or does not correctly interpret the results.