University of Macau
Department of Electromechanical Engineering
MECH205 - Electrical Engineering
Syllabus
1st Semester 2012/2013
Part A – Course Outline

Compulsory course in Electromechanical Engineering

Course description:
Introduction to electrical engineering. Fundamentals of electric circuits. Resistive Network Analysis. AC Network Analysis. Complex Power. Transformers. Three-phase Power. Grounding and Safety. Generation and Distribution of AC Power. Introduction to PSPICE. Introduction to electro-mechanics. Introduction to electric machines.

Prerequisite:
None

Textbook:
- G. Rizzoni, ***Principles and Applications of Electrical Engineering***, Latest edition, McGraw-Hill.

References:
- E. Hughes, ***Electrical and Electronic Technology***, Latest Edition, Prentice Hall.
- G. Rizzoni, ***Fundamentals of electrical engineering***, Latest edition, McGraw-Hill.

Course objectives:
To provide an opportunity to students to:
1. Introduce to students basic knowledge of mathematics and science in electrical engineering; [a, e, k]
2. Conduct experiments and analyze experimental data via team work; [b, d]
3. Introduction of computational tools for circuit analysis; [l]
4. Understandings in electrical instrumentation; [k]
5. Understandings in electrical safety. [f]

Topics covered:
1. **Introduction to electrical engineering**
2. **Fundamentals of electric circuits**
3. **Analysis of resistive and AC networks**
4. **Computer-aided network analysis**
5. **AC power**
7. **Introduction to electro-mechanics**
8. **Introduction to electric machines**

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	0	2	14	70	4	1 / 3hrs

Contribution of course to meet the professional component:
This course prepares students to work professionally in the area of **electrical engineering**.

Relationship to EME program objectives and outcomes:

This course primarily contributes to Electromechanical Engineering Program outcomes that develop student abilities to:
(a) An ability to apply knowledge of mathematics, science, and engineering;
(b) An ability to design and conduct experiments, as well as to analyze and interpret data;
(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 program outcomes that develop student abilities to:
(d) An ability to function on multidisciplinary teams;
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline.

Course content:

Maths	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies	Total 100%
0	0	100	0	0	100

Persons who prepared this description:

Ir. Dr. T.W. Ching

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Part B General Course Information and Policies

2nd Semester 2012/2013

Instructor: Ir. Dr. T.W. Ching
Office: N302
Office Hour: By appointment
Phone: (853) 8397-4352
Email: twching@umac.mo

Time/Venue:

Every Monday, 2:30 a.m. - 4:30 p.m., Room J210
Every Thursday, 2:30 a.m. - 4:30 p.m., Room J218

Assessment:

Final assessment will be determined on the basis of:

Homework:	20%
Lab Report:	20%
Mid-term	20%
Final Exam (Comprehensive):	40%

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

Homework Policy:

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

- There will be approximately 4 homework assignments.
- No late homework is accepted.
- Possible revision of homework grades may be discussed with the grader within one week from the return of the marked homework
- The homework grade will be based on the average of the assignment grades.

Mid-term Exam

Mid-term exam will be held during the semester. There will be a 120-miniute exam.

Note

- Attendance is strongly recommended.
- No make-up exam is given except for CLEAR medical proof.
- Cheating is absolutely prohibited by the university.

Appendix - Rubric for Program 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 (b)	5 (Excellent)	3 (Average)	1 (Poor)
Conduct experiments	Student successfully completes the experiment, records the data, analyzes the experiment's main topics, and explains the experiment concisely and well.	Student successfully completes the experiment, records the data, and analyzes the experiment's main topics.	Student either does not complete the experiment successfully, or completes it successfully but does not record the correct data.
Design experiments	Student understands what needs to be tested and designs an appropriate experiment that takes into account the limitations of the equipment and measurement accuracy.	Student understands what needs to be tested and designs an appropriate experiment, but may not fully understand the limitations of the measurements.	Student does not understand what needs to be tested and/or does not design an appropriate experiment.

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 (d)	5 (Excellent)	3 (Average)	1 (Poor)
Ability to work in teams	Performance on teams is excellent with clear evidence of equal distribution of tasks and effort as well as frequent meetings of the team members.	Performance on teams is acceptable with one or more members carrying a larger amount of the effort as well as infrequent meetings of the members or one or more members being absent from several meetings.	Performance on teams is poor to unacceptable with one or two members clearly carrying the majority of the effort as well as inadequate team meeting or one or more members missing the majority of the meetings.
Multi-disciplinary teams	Team consists of members from two or more different engineering/science/business fields (this could contain some members not actually enrolled in the course but interacting as part of a competition, collaboration, etc.)	Team consists of members from two or more concentrations within the Department of Electromechanical Engineering	Team consists of members from the same concentration within the Department of Electromechanical Engineering

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 (f)	5 (Excellent)	3 (Average)	1 (Poor)
Design	Understand how to critique and analyze design tradeoffs and constraints with respect to safety, liability, and integrity of data, and context of use	Have knowledge of safety, liability, and integrity of data, and context of use but cannot analyze thoroughly	No awareness of importance of safety, liability, and integrity of data, and context of use
Professional Engineering Practice	Understand how to critique and analyze tradeoffs and constraints with respect to research issues of credit and authorship, integrity of data, and informed consent	Have knowledge of credit and authorship, integrity of data, and informed consent but cannot completely identify ownership in practical	No awareness of credit and authorship, integrity of data, and informed consent
Group Relations	Understand how to critique and analyze tradeoffs and constraints with respect to conflict of interest, bribery, professional dissent, authorship, and discrimination	Have partial knowledge of conflict of interest, bribery, professional dissent, authorship, discrimination but cannot apply it in practice correctly	No awareness of conflict of interest, bribery, professional dissent, authorship, and discrimination

Rubric for (k)	5 (Excellent)	3 (Average)	1 (Poor)
Use modern hardware tools in engineering practice	Student uses the hardware to measure and/or build engineering systems/designs correctly, and understands the limitations of the hardware.	Student uses the hardware to measure and/or build engineering systems/designs correctly.	Student does not use the hardware correctly.

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.