University of Macau
Department of Electromechanical Engineering
EMEB375 – Special Topics in Electromechanical Engineering II
Syllabus
2nd Semester 2014/2015
Part A – Course Outline

Required elective course in Electromechanical Engineering

Course description:
3 credits. Any specialized topic in Electromechanical Engineering chosen by the staff member who has experienced in that particular field, but the topic is not covered by other undergraduate courses in the Electromechanical Engineering Programme.

Prerequisite:
None

Textbook:
TBA

Course objectives:
TBA

Topics covered:
TBA

Class/practice schedule:
TBA

Contribution of course to meet the professional component:
TBA

Relationship to EME programme objectives and outcomes:
The course secondarily 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;
(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;
(d) An ability to function on multidisciplinary teams;
(e) An ability to identify, formulate, and solve engineering problems.
(f) An understanding of professional and ethical responsibility;
(g) An ability to communicate effectively;
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context;
(i) An ability to recognize the need for, and to engage in life-long learning;
(j) A knowledge of contemporary issues;
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline.
(l) An ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations.

Course content:
TBA

Course coordinator:

Prof. Pak Kin Wong

Persons who prepared this description:

TBA

Part B General Course Information and Policies

2nd Semester 2014/2015

Instructor: TBA
Office: E11-4042-b
Office Hour: By appointment
Phone: (853) 8822-4956
Email: fstpkw@umac.mo

Time/Venue:

TBA

Assessment:

Final assessment will be determined on the basis of:
TBA

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:

- TBA

Mid-term Exam:

TBA

Note:

- TBA

Student Disabilities Support Service:

The University of Macau is committed to providing an equal opportunity in education to persons with disabilities. If you are a student with a physical, visual, hearing, speech, learning or psychological impairment(s) which substantially limit your learning and/or activities of daily living, you are encouraged to communicate with your instructors about your impairment(s) and the accommodations you need in your studies. You are also encouraged to contact the Student Disability Support Service of the Student Counselling and Development Section (SCD) in Student Affairs Office, which provides appropriate resources and accommodations to allow each student with a disability to have an equal opportunity in education, university life activities and services at the University of Macau. To learn more about the service, please contact SCD at scd.disability@umac.mo, or 8822 4901 or visit the following website: http://www.umac.mo/sao/scd/sds/aboutus/en/scd_mission.php

Appendix - Rubric for Program Outcomes

(a) An ability to apply knowledge of mathematics, science, and engineering appropriate to the degree discipline

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to apply knowledge of mathematics to the solution of complex engineering problems.	Students understand mathematical principles (e.g. calculus, differential equations, linear algebra, probability and statistics) relevant to electromechanical engineering and their limitations in the respective application. Use mathematical principles to formulate for an engineering problem.	Students understand the theoretical background and choose mathematical principles relevant to electromechanical engineering, but have trouble in model development.	Students do not understand the background completely. Use wrong models, or do not know how to model.
2. An ability to apply knowledge of science to the solution of complex engineering problems.	Students understand the theories and principles of basic sciences (e.g. physics, chemistry, etc.). Use these principles to formulate models of physical processes and systems relevant to electromechanical engineering.	Students understand the theoretical background and choose scientific principles relevant to electromechanical engineering, but have trouble in model development.	Students do not understand the background completely. Use wrong scientific principles, or do not know how to model.
3. An ability to apply knowledge of engineering fundamentals to the solution of complex engineering problems.	Students combine mathematical and/or scientific principles to formulate for a problem relevant to electromechanical engineering. Understand limitations of these formulations in the respective application.	Students understand engineering concepts and principles, but have trouble in the development of formulation.	Students do not understand engineering concepts and principles completely. Use wrong models, or do not know how to model.
4. An ability to apply knowledge of engineering specialization to the solution of complex engineering problems.	Students understand the theoretical framework and body of knowledge for an electromechanical engineering specific area (e.g. thermal / fluid / materials / manufacturing / mechatronic / electrical / electronic engineering, etc.). Use the related knowledge to analyze an engineering problem correctly.	Students understand the theoretical framework of a specific area, but cannot analyze engineering problems relevant to this specific area correctly.	Students do not understand the theoretical framework of a specific area completely. Use wrong approaches, or do not know how to analyze problems.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to design and conduct experiments for complex engineering problems using research-based knowledge and research methods.	Students use sufficient number of specifications and appropriate guidelines to design and conduct experiments for complex engineering problems.	Students use a few number of specifications and appropriate guidelines to design and conduct experiments for complex engineering problems.	Students use very little or no specifications and appropriate guidelines to design and conduct experiments for complex engineering problems.
2. An ability to analyze and interpret experimental data of complex engineering problems using research-based knowledge and research methods.	Students have idea and able to analyze and interpret experimental data of complex engineering problems clearly using suitable equations and software.	Students have idea and able to analyze and interpret experimental data of complex engineering problems partially using suitable equations and software.	Students are unable to analyze or interpret experimental data of complex engineering problems using suitable equations and software.
3. An ability to synthesize information of complex engineering problems to provide valid conclusions.	Students can present the results of complex engineering problems clearly by using texts, graphics and tables with suitable explanations.	Students can present the results of complex engineering problems partially by using texts, graphics and tables with suitable explanations.	Students cannot present the results of complex engineering problems clearly by using texts, graphics and tables with suitable explanations.

(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

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to design solutions for complex engineering problems that meet specified needs and constraints with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	Students have clear idea and able to design suitable strategy or solutions for complex engineering problems that meet specified needs and constraints with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	Students have idea but only able to partially design suitable strategy or solutions for complex engineering problems that meet specified needs and constraints with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	Students have no idea and not able to design suitable strategy or solutions for complex engineering problems that meet specified needs and constraints with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
2. An ability to design systems, components or processes that meet specified needs and constraints with appropriate consideration for public health and safety,	Students have clear idea and able to use suitable specifications to design systems, components or processes that meet specified needs and constraints with appropriate consideration for public	Students have idea but not able to use specifications to design systems, components or processes that meet specified needs and constraints with appropriate consideration for public health and safety, cultural,	Students have no idea and not able to use specifications to design systems, components or processes that meet specified needs and constraints with appropriate consideration

cultural, societal, and environmental considerations.	health and safety, cultural, societal, and environmental considerations.	societal, and environmental considerations.	for public health and safety, cultural, societal, and environmental considerations.

(d) An ability to function on multi-disciplinary teams

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to function effectively as an individual and a member in diverse teams and in multi-disciplinary settings.	Students cooperate with other team members. Routinely present at team meetings and contribute a fair share to the project.	Students interact with a minor group in the team. Absent occasionally and sometimes depend on others to complete the work.	Students work alone. Absent from more than half of team meetings and do not contribute to group work.
2. An ability to participate in multidisciplinary team discussion, respect team members' opinions, communicate ideas and make group decisions.	Students actively participate in multi-disciplinary team discussion, respect team members' opinions, communicate ideas and make group decisions.	Students always persuade others to accept their own ideas and do not encourage other members.	Students do not assume team roles. Do not consider the ideas of others and criticize the performance of other members.

(e) An ability to identify, formulate and solve engineering problems

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to identify complex engineering problems	Students can identify how various pieces are related to a complex engineering problem. Understand the relation between theories and practical problems.	Students can identify most but miss some pieces of the whole problem and do not fully understand the relation between theories and practical problems.	Students cannot identify the major components of the whole problem and do not understand the relation between theories and practical problems.
2. An ability to solve and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences	Students can apply theories to formulate strategies for solving complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.	Students apply theories to formulate strategies to solve engineering problems of moderate difficulty reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.	Students have no coherent strategies for problem solving and use no resources to reach substantiated conclusions.

(f) An understanding of professional and ethical responsibility

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to apply ethical principles of engineering practice.	Students understand and are able to apply the knowledge of safety, liability, and integrity of data, and context of use with respect to engineering practice.	Students have knowledge of safety, liability, and integrity of data and context of use with respect to engineering practice but cannot analyze thoroughly.	Students do not aware of the importance of safety, liability, and integrity of data, and context of use with respect to engineering practice.
2. An ability to understand to professional ethics and responsibilities and norms of engineering practice.	Students have a good knowledge of the Code of Professional Engineers and other bases for ethical behavior including the knowledge of conflict of interest, bribery, and authorship.	Students have partial knowledge of the Code of Professional Engineers and other bases for ethical behavior including the knowledge of conflict of interest, bribery, and authorship.	Students have insufficient knowledge of the Code of Professional Engineers and other bases for ethical behavior including the knowledge of conflict of interest, bribery, and authorship.
3. An ability to apply reasoning informed by contextual knowledge to assess legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	Students are able to apply reasoning informed by contextual knowledge to assess legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	Students partially apply reasoning informed by contextual knowledge to assess legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	Students do not apply reasoning informed by contextual knowledge to assess legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

(g) An ability to communicate effectively

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to produce reports related to the description of experiments, projects, or solutions to engineering problems.	Students produce well-organized reports with adequate content and understandable language, grammar or syntax.	Students produce reports with adequate content and language, grammar or syntax with some errors.	Students produce reports with inadequate content, barely understandable language, grammar or syntax.
2. An ability to make effective presentations and responses during dialogue sessions.	Students make effective oral presentations and rational responses.	Students make oral presentations but cannot give rational responses.	Students are unable to make oral presentations and responses.
3. An ability to produce engineering drawings and/or design documentations on engineering problems	Students make effective engineering drawings and/or design documentations to illustrate the idea.	Students cannot effectively show the idea in the engineering drawings and/or design documentations.	Students cannot show the idea in the engineering drawings and/or design documentations.

(h) An ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to apply reasoning informed by contextual knowledge to assess societal, health and safety issues and the consequent responsibilities relevant to professional engineering practice.	Students apply reasoning informed by contextual knowledge to assess societal, health and safety issues and the consequent responsibilities relevant to electromechanical engineering practice**.**	Students partially apply reasoning informed by contextual knowledge to assess societal, health and safety issues and the consequent responsibilities relevant to electromechanical engineering practice**.**	Students are unable to apply reasoning informed by contextual knowledge to assess societal, health and safety issues and the consequent responsibilities relevant to electromechanical engineering practice.
2. An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.	Students understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development**.**	Students partially understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development**.**	Students do not understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development**.**

(i) An ability to stay abreast of contemporary issues

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to be aware of or familiar with current topics and issues relevant to current global and societal affairs.	Students are aware of or familiar with current topics and issues relevant to current global and societal affairs.	Students are partially aware of or familiar with current topics and issues relevant to current global and societal affairs.	Students are not aware of or familiar with current topics and issues relevant to current global and societal affairs
2. An ability to understand current topics and issues with some knowledge regarding their impact in a bigger global and societal sense	Students understand current topics and issues with some knowledge regarding their impact in a bigger global and societal sense.	Students understand moderately current topics and issues with some knowledge regarding their impact in a bigger global and societal sense.	Students do not understand current topics and issues with some knowledge regarding their impact in a bigger global and societal sense

(j) An ability to recognize the need for, and to engage in life-long learning

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to recognize the need for independent and life-long learning in the broadest context of technological change.	Students recognize the need for independent and life-long learning in the broadest context of technological change.	Students recognize to some extent the need for independent and life-long learning in the broadest context of technological change.	Students do not recognize the need for independent and life-long learning in the broadest context of technological change.
2. An ability to have the preparation in independent and life-long learning in the broadest context of technological change	Students are well prepared in independent and life-long learning in the broadest context of technological change	Students have some preparation in independent and life-long learning in the broadest context of technological change.	Students are not prepared in independent and life-long learning in the broadest context of technological change.
3. An ability to engage in independent and life-long learning in the broadest context of technological change.	Students engage in independent and life-long learning in the broadest context of technological change.	Students engage to some degree in independent and life-long learning in the broadest context of technological change.	Students do not engaged in independent and life-long learning in the broadest context of technological change.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to apply appropriate techniques, resources, and modern engineering tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.	Students build engineering systems/designs correctly, and understand the limitations of the hardware for building the engineering systems/designs.	Students incompletely build engineering systems/designs.	Students are unable to build the engineering systems/designs correctly.

(l) An ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to develop appropriate computer/IT tools relevant to complex engineering activities.	Students develop and design the software program to correctly analyze engineering problems and/or create engineering designs.	Students develop part of the software program to correctly analyze engineering problems and/or create engineering designs.	Students are unable to develop the software program to correctly analyze engineering problems and/or create engineering designs.
2. An ability to apply appropriate computer/IT tools relevant to complex engineering activities.	Students apply the computer/IT tools to correctly analyze engineering problems and/or create engineering designs.	Students unskillfully apply the computer/IT tools to correctly analyze engineering problems and/or create engineering designs.	Students are unable to apply the computer/IT tools to correctly analyze engineering problems and/or create engineering designs.
3. An ability to understand the limitations of the computer/IT tools.	Students understand the limitations of the computer/IT tools.	Students do not completely understand the limitations of the computer/IT tools.	Students do not understand the limitations of the computer/IT tools.