Xi'an Jiaotong-Liverpool University
西交利物浦大学

Department of Electrical and Electronic Engineering

MODULE HANDBOOK

EEE225

Advanced Electrical Circuits and Electromagnetics

Zhao Wang

Semester 1

2018/2019

SECTION A: Basic Information

- **Brief Introduction to the Module**

As the advanced course of EEE103 and EEE108 Electromagnetics, this module deepen the knowledge of electrical circuits and static fields, and develop the varying circuits and electromagnetic fields based on them. After that, the electromagnetic waves and transmission lines are introduced and some practical circuits are discussed.

During the learning, problem sheet will be provided for review and practice, and the answer will be uploaded to ICE after the tutorial class.

- **Key Module Information**

Module name: *Advanced Electrical Circuits and Electromagnetics*

Module code: *EEE225*

Credit value: *5*

Semester in which the module is taught: *S1*

Pre-requisites needed for the module: *EEE103 and EEE108*

Programmes on which the module is shared:
BEng Electrical Engineering
BEng Electronic Science and Technology
BEng Telecommunications Engineering

- **Delivery Schedule**

Lecture room: *EE118.*

Lecture time: *Monday 9:00-11:00 and Tuesday 11:00 - 13:00 Week 1-6, 8-14.*

Office hour: *Tuesday 13:30-15:30, Wednesday 13:30-15:30.*

Lab room: *EE215.*

Lab time: *Thursday: 11:00-13:00, 14:00-18:00, Week 6 and week 11.*

- **Module Leader and Contact Details**

Name: *Zhao Wang*

Brief Biography:

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Office telephone number: *+86 (0)512 8816 1421*

Room number and office hours: *EE322; by appointment*

Preferred means of contact: *Zhao.Wang@xjtlu.edu.cn*

- **Additional Teaching Staff and Contact Details**

SECTION B: What you can expect from the module

- **Educational Aims of the Module**

To equip students with tools to analyse inter-related circuits and with the understanding of the nature of electric, magnetic and electromagnetic fields, which are important to engineering and applications.

- **Learning Outcomes**

A	Understand the response of simple networks to transient signals, including the first order and second order circuits;
B	Understand the magnetically coupled circuits and the concept of mutual inductance, the three phase networks and the concept of a balanced and unbalanced network, and the the interconnection of two port networks including maximum power transfer, insertion loss and impedance matching;
C	Understand the Electrostatics and Magnetostatics, including the fundamental knowledge, boundary conditions and materials properties;
D	Understand the use of Maxwell's equations in differential and integral form for engineering applications, and the energy aspects of electromagnetic fields and understand the principle and properties of the plane waves in free space and guided waves in guiding media;

E	Be able to analyse the circuits and calculate voltages, currents and powers involved, and to analyse the EM fields and waves and calculate field intensity, flux density, potentials, currents and powers involved;
F	Be able to perform measurements on the introduced circuits, to analyse and present results, and to provide an interpretation of those results;
G	Be able to perform independent learning and master the problem solving and design skills.

❑ Assessment Details

Initial Assessment

Sequence	**Method**	**Assessment Type(EXAM or CW)[2]**	**Learning outcomes assessed***(use codes under Learning Outcomes)*	**Duration**	**Week**	**% of Final Mark**	**Resit(Y/N/S)[3]**
1	Formal Exam	EXAM	A-E, G	3 hours		60	Y
2	Laboratory	CW	A, F, G			20	N
3	Assignment	CW	C-E, G			20	N

Resit Assessment

Sequence	**Assessment Type (EXAM or CW)**	**Learning outcomes assessed** *(use codes under Learning Outcomes)*	**Duration**	**Week**	**% of Final Mark**
R001	Exam	A-E, G	3 hours		60

Marks for components where no resit arrangements are made for the students will be carried forward, whether or not they are passed or failed, and will be calculated, with the same weighting, in the final module mark.

❑ Methods of Learning and Teaching

This module will be delivered through a combination of formal lectures, tutorials and supervised laboratory sessions.

❑ Syllabus & Teaching Plan

Week	Monday			Tuesday		
	lect			lect		
1	1,2	Introduction	Math review	3,4	Review of EEE103 and EEE108	
2	5,6	Electrostatics		7,8	Magnetostatics	
3	9,10	Steady currents		11,12	Capacitor, inductor, resistor	
4	13,14	Circuits - review		15,16	Transient - 1st	
5	17,18	Transient - 2nd		19,20	Transient - driven	
6	21,22	Frequency response		23,24	Circuit review + Lab 1	
8	25,26	Two-port networks		27,28	Maxwell's Equations	
9	29,30	Electromagnetics		31,32	Plane waves	
10	33,34	Transmission Lines		35,36	More about waves	
11	37,38	EM review + Lab 2		39,40	Waveguides	
12	41,42	Magnetically Coupled Circuits		43,44	Magnetically Coupled Circuits	
13	45,46	Three phase system		47,48	Three phase system	
14	49,50	Final Review		51,52	Final Review	

❑ Reading Materials

Recommended Texts:

Title	Author	ISBN/Publisher
Electric Circuits, 9th Ed.	James W. Nilsson, Susan A. Riedel	9787121157349
Engineering Electromagnetics	W.Hayt, J.Buck	9787302204077
Engineering Circuit Analysis, 8th Ed.	William H. Hayt, Jr. Jack E. Kemmerly, Steven M. Durbin	9787121171376
Fundamentals of Electric Circuits	Charles K. Alexander, Matthew N. O. Sadiku	9787302159841
Electromagnetic Filed Theory Fundamentals	B.S.Guru, H.R.Hiziroglu	9787111158318
Field and Wave Electromagnetics	D.K.Cheng	9787302152125

Additional Readings:

All the materials uploaded to ICE.

SECTION C: Further Information

- **Student Feedback**

  The University is keen to require student feedback to make improvements for each module in every session. It is University policy that the preferred way of achieving this is by means of an Online Module Evaluation Questionnaire Survey. Students will be invited to complete the questionnaire survey for this module at the end of the semester.

  You are strongly suggested to read policies mentioned below very carefully, which will help you better perform in your academic studies. All the policies and regulations related to your academic study can be found in Student Academic Services section under the heading "Policies and Regulations" on E-bridge.

- **Plagiarism, Cheating, and Fabrication of Data.**

  Offences of this type can result in attendance at a University-level committee and penalties being imposed. You need to be familiar with the rules. Please see the "Policy for Dealing with Plagiarism, Collusion and Data Fabrication" document available on e-Bridge in the Student Academic Services section under the heading 'Policies and Regulations'.

- **Rules of submission for assessed coursework**

  The University has detailed rules and procedures governing the submission of assessed coursework. You need to be familiar with them. Details can be found in the "Code of Practice for Assessment" document available on e-Bridge in the Student Academic Services section under the heading 'Policies and Regulations'.

- **Late Submission of Assessed Coursework**

  The University attaches penalties to the late submission of assessed coursework. You need to be familiar with the University's rules. Details can be found in the "Code of Practice for Assessment" document available on e-Bridge in the Student Academic Services section under the heading 'Policies and Regulations'.

- **Mitigating Circumstances**

  The University is able to take into account mitigating circumstances such as illness or personal circumstances which may have adversely affected student performance on a module. It is the student's responsibility to keep their Academic Adviser, Programme Director or Head of Department informed of illness and other factors affecting their progress during the year and especially during the examination period. Students who believe that their performance on an

examination or assessed coursework may have been impaired by illness, or other exceptional circumstances should follow the procedures set out in the Mitigating Circumstances Policy, which can be found on e-Bridge in the Student Academic Services section under the heading ‘Policies and Regulations’.

- **ICE**

  Copies of lecture notes and other materials are available electronically through ICE, the University’s virtual learning environment at: ICE @ XJTLU.