课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	**课程名称 Course Title**	MATLAB 工程应用 Introduction to MATLAB for Engineers
2.	**授课院系** **Originating Department**	机械与能源工程系 Department of Mechanical and Energy Engineering
3.	**课程编号** **Course Code**	ME112
4.	**课程学分 Credit Value**	2
5.	**课程类别** **Course Type**	通识选修课程 General Education (GE) Elective Courses
6.	**授课学期** **Semester**	春季 Spring
7.	**授课语言** **Teaching Language**	中英双语 English & Chinese
8.	**授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师）** **Instructor(s), Affiliation& Contact (For team teaching, please list all instructors)**	魏艳 南方科技大学 机械与能源工程系 Department of Mechanical and Energy Engineering
9.	**实验员/助教、所属学系、联系方式** **Tutor/TA(s), Contact**	待公布 To be announced
10.	**选课人数限额(可不填)** **Maximum Enrolment（Optional）**	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other（Please specify）	总学时 Total
学时数 Credit Hours	16		32		48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 No.
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	
14. 其它要求修读本课程的学系 Cross-listing Dept.	

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

MATLAB 是 MathWorks 公司推出的一套高性能的数值计算和可视化软件，可以解决工程、科学计算和数字信号处理、通信、数学等学科中许多问题。本课程主要介绍 MATLAB 语言的应用环境、调试命令，各种基本命令和高级操作命令，绘图功能函数，循环和条件分支等控制流语句。之后介绍利用 MATLAB 来实现代数方程、微分方程以及积分方程的求解。课程最后简介 MATLAB 语言中的几个主要工具箱，为后续的专业课程提供有力的工具。本课程以讲课为主，结合上机实验，使学生通过编程实例掌握 MATLAB 语言的编程基础与技巧。

MATLAB is a set of high-performance numerical computation and visualization software introduced by The MathWorks, which can solve many problems in engineering, scientific computing and digital signal processing, communication, mathematics and other disciplines. This course introduces the MATLAB language application environment, debugging commands, various basic commands and advanced operating commands, drawing function, loop and conditional branch control flow statement. Then application of MATLAB in solving algebraic equations, differential equations and integral equations is solved. The course provides with powerful tools for subsequent professional courses. This course includes mainly lectures, combined with labs, so that students can master MATLAB programming fundamentals and skills.

16. 预达学习成果 Learning Outcomes

通过本课程的学习，学生应该实现以下要求：
1. 编制简单程序和函数
2. 利用控制和循环结构实现程序功能
3. 利用MATLAB绘制不同类型的二维和三维图形
4. 通过MATLAB实现读和写不同类型的文件（Excel, text文档等）
5. 熟悉MATLAB中的多项式和曲线拟合工具
6. 利用MATLAB求解微分和积分方程
7. 利用MATLAB的Simulink工具箱实现创建模型、数据采集以及分析仿真结果

Through this course, students should meet the following requirements:
1. Be able to make basic programs using script files and function files
2. Understand control and loop statements to make programs
3. Be able to apply various plotting tools in MATLAB to make 2D and 3D figures
4. Read/write from/to various file formats such as Excel, text files, etc.
5. Be familiar with polynomial and curve fitting tools in MATLAB
6. Solve differential and integral equations with MATLAB
7. Apply Simulink toolbox to achieve the creation of models, data acquisition and analysis of the simulation results

17. 课程内容及教学日历 （如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）
Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

课程内容	学时分配	教学要求
MATLAB 概述 及其变量与数据 Introduction to MATLAB Variable and data	2h	1、 了解 MATLAB 的主要功能。熟悉 MATLAB 变量的命名，赋值语句，数据的输出格式。 2、 矩阵的生成（标量，向量和矩阵的生成） 3、 数组运算（数组加法、减法、乘法、除法、乘方运算、数组的函数运算、数组关系运算、数组逻辑运算） 4、 矩阵运算（加减法运算，转置，乘法，求逆） 数据的输入输出 1. Understand the main functions of MATLAB. Be familiar with the MATLAB variable, assignment statement, data output format 2. Generation of matrix (scalar, vector and generation of matrix) 3. Array operations (Array addition, subtraction, multiplication, division, power operations, array function operations and array logic operation) 4. Matrix operation (Addition and subtraction, transpose, multiplication, inversion), Input and output of data
MATLAB 程序设计	4h	1. M 文件的建立与编辑 2. 程序控制流语句（顺序结构、循环结构- for 和 while 语句、条件分支结构-if 和 break 语句, switch 语句） 3. 数据和文件的输入输出 4. 用户自定义函数 1. M file creation and edition 2. Program control flow statement (order structure, loop structure, for and while structure, if, break and switch function) 3. Input and output of data file 4. User defined function
MATLAB 绘图 Create figures with MATLAB	2h	1、 二维图形的绘制（常用二维图形绘图函数、图形的线型和颜色控制、图形的标注、坐标轴的控制方法） 2、 三维图形的绘制（三维曲线的绘制、三维曲面的绘制） 3、 三维图形的精细处理（裁剪、色彩处理，光照处理） 4、 图像和动画 1. Create 2D figure (Command figure creation function, line types and color, notation of figure and control of axis) 2. Create 3D figure (Drawing of 3D curve and drawing of 3D surface) 3. Process 3D figure (Crop, color processing and light treatment) 4. Images and animation
MATLAB 数据和数值计算 Data and numerical computation with MATLAB	6h	1、 多项式运算（多项式表达方式） 2、 代数方程求解（多项式方程求根；线型方程组求根；非线性方程组求根） 3、 数据统计与分析（数据插值与拟合运算） 4、 函数的数值微分和积分运算 5、 微分方程的求解 6、 积分方程的求解 1. Polynomial operation (Polynomial expression) 2. Solving algebraic equations (Find roots of polynomial equations, linear equations and nonlinear equations)

		3. Data statistics and analysis (Data interpolation and fitting) 4. Differential and integral operations of function 5. Solving differential equation 6. Solving integral equation
介绍仿真软件 Simulink 工具箱 Introduction of Simulink toolbox	2h	1、 Simulink 基本模块和电力系统模块简介 2、 Simulink 建模方法和步骤 3、 Simulink 仿真运行及结果分析 1. Introduction of modules and power system in Simulink 2. Modelling methods and steps in Simulink 3. Simulation and results analysis in Simulink
理论课合计 Total	16h	

实验课（Lab）：

课次	课程内容	学时	教学要求 Objectives
1	MATLAB 基础 Fundamentals of MATLAB	2h	熟悉 Matlab 界面，了解 Matlab 工作环境；熟悉 MATLAB 命令窗口及文件管理以及 MATLAB 帮助系统 熟悉 Matlab 变量类型，定义以及命名规则 Be familiar with MATLAB interface; Understand MATLAB working environment; Be familiar with MATLAB command winder and file management and help documentation Be familiar with MATLAB variable types, definition and name conentions
2	MATLAB 数值数组及其矩阵操作的运用 Matrix operations	2h	熟悉用 MATLAB 数据的操作，包括数据和矩阵的生成、矩阵的加减乘除运算以及求逆矩阵 Be familiar with MATLAB data, including matrix generation, addition, subtraction, multiplication, matrix division and matrix inversion
3	MATLAB 程序设计 MATLAB programming	6h	熟悉用 MATLAB 设计一些简单的 MATLAB 程序 熟悉用程序控制结构（if-else, for, while, switch）设计一些程序 Design some simple programs with MATLAB Design programs with control structure (if-else, for, while and switch)
4	MATLAB 绘图 Create figures with MATLAB	6h	熟悉用 MATLAB 绘制二维图形、三维图形以及三维曲面 Create 2D and 3D figures with MATLAB
5	MATLAB 数据和数值计算 Numerical simulation with MATLAB	12h	熟悉程序求解多项式运算（多项式表达方式），代数方程求解，数据插值和拟合。熟悉用 MATLAB 求解微分和积分方程 Solve polynomial equation, data fitting and interpolation Solve differential and integral equations with MATLAB
6	Simulink 工具箱的运用 Application of Simulink toolbox in MATLAB	4h	熟悉用 Simulink 工具箱的模块建立数学模型；控制系统的性能分析；控制系统的根轨迹分析方法 Create numerical model with SIMULINK; Analysis of control system performance;
合计 Total		32h	

18. 教材及其它参考资料 Textbook and Supplementary Readings

1. MATLAB 编程与工程应用(第二版)， Stormy Attaway 著，鱼滨， 赵元哲等译
2. Hahn, B. H. and Valentine, D. T., "Essential MATLAB for Engineers and Scientists," Fifth Edition, Academic Press, 2013. ISBN 978-0-12-394398-9.
3. Matlab 帮助手册

课程评估 ASSESSMENT

19.

评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects		20%		
平时作业 Assignments		30%		
期中考试 Mid-Term Test		25%		
期末考试 Final Exam		25%		
期末报告 Final Presentation				
其它（可根据需要改写以上评估方式） Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

√ A. 十三级等级制 Letter Grading
☐ B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
This Course has been approved by the following person or committee of authority