# 东北大学秦皇岛分校本科课程教学大纲

## 一、课程基本信息

<table>
<tr><td>开课单位</td><td colspan="3">东北大学<br>悉尼智能科技学院</td><td>课程代码</td><td colspan="6">3100113012</td></tr>
<tr><td>中文名称</td><td colspan="9">电路分析与设计</td></tr>
<tr><td>英文名称</td><td colspan="9">Circuit Analysis and Design</td></tr>
<tr><td>总学时</td><td>56</td><td rowspan="2">理论学时</td><td rowspan="2">56</td><td rowspan="2">实验学时</td><td rowspan="2">0</td><td rowspan="2">上机学时</td><td rowspan="2">0</td><td rowspan="2">设计学时</td><td rowspan="2">0</td><td rowspan="2">课外学时</td><td rowspan="2">0</td></tr>
<tr><td>学　分</td><td>3.5</td></tr>
<tr><td>课程类型</td><td colspan="11">☑理论课程　☐理论（含实验）课程　☐实践类课程</td></tr>
<tr><td>课程类别</td><td colspan="11">☐通识类　☐学科基础类　☑专业方向类　☐实践类</td></tr>
<tr><td>适用专业</td><td colspan="11">通信工程<br>Communication Engineering</td></tr>
<tr><td>先修课程</td><td colspan="11">电气电子工程导论<br>Introduction to Electrical and Electronic Engineering</td></tr>
<tr><td>建议开课学期</td><td colspan="11">☐1-1 ☐1-2 ☐2-1 ☐2-2 ☑3-1 ☐3-2<br>☐4-1 ☐4-2 ☐5-1 ☐5-2 ☐*（代表每学期都开设）</td></tr>
<tr><td>考核方式</td><td colspan="3">☑考试 ☐考查</td><td>成绩分制</td><td colspan="6">☑百分制 ☐五级制 ☐二级制</td></tr>
<tr><td>使用教材</td><td colspan="11">1、James W. Nilsson and Susan A. Riedel, Electric Circuits: Global Edition, 10th Edition.</td></tr>
<tr><td>参考书及教学资源</td><td colspan="11">1、 https://lms.cloudcampus.com.cn/courses/68/files</td></tr>
<tr><td>其他说明</td><td colspan="11">无</td></tr>
</table>

## 二、课程简介

中文描述

本课程让学生全面了解电路分析的基本概念，重点是频域分析技术。学生开始电路的理论和计算机辅助设计，并使用适当的实验室设备和/或仿真软件构建和实验验证电路行为。开始本课程的学习前时，学生需要具备基本器件的知识，如电阻器、电容器、电感器和运算放大器，以及基本的电路分析技能，如网格和节点分析、戴维南定理和诺顿定理、源变换和叠加。以这种理解为起点，本课程介绍了支撑信号和系统分析的基本理论模型。涵盖的主题包括：使用相量变换的正弦稳态分析；推导常微分方程以模拟电路，并使用拉普拉斯变换求解这些方程；单相和三相交流电路中的电源；传递（网络）函数、极点和零点、s 平面分析和波特图；一阶和二阶系统；时域和频域解决方案；对阶跃、脉冲和周期性输入的响应；使用卷积对任意输入的响应；频率选择电路；傅里叶级数；以及双端口电路。学生使用分析建模，辅以电路仿真和 MATLAB 等符号软件，来研究和设计现实世界的电路。实验室会议强调实验结果和模型预测的比较。

English Description

This subject gives students a thorough understanding of the fundamental concepts of circuit analysis, with the focus being on analysis techniques in the frequency domain. Students embark on theoretical and computer-aided design of circuits, and construct and experimentally verify circuit behavior using appropriate laboratory equipment and/or simulation software. On entry to this subject, students are assumed to have knowledge of basic devices, such as resistors, capacitors, inductors and operational amplifiers, as well as basic circuit analysis skills, such as mesh and nodal analysis, Thevenin's and Norton's theorems, source transformation and superposition. Using this understanding as a starting point, the subject introduces the basic theoretical models that underpin signals and system analysis. Topics covered include: sinusoidal steady-state analysis using phasor transformation; derivation of ordinary differential equations to model circuits and solution of those equations using Laplace transformation; power in single and three-phase AC circuits; transfer (network) functions, poles and zeros, s-plane analysis and Bode plots; first- and second-order systems; time and frequency domain solutions; response to step, impulse and periodic inputs; response to an arbitrary input using convolution; frequency selective circuits; Fourier series; and two-port circuits. Students use analytic modelling, aided by circuit simulation and symbolic software such as MATLAB, to investigate and design real-world circuits. Comparison of experimental results and model predictions is emphasized in the laboratory sessions.

# 三、课程目标

**1、知识目标：**

1-1：掌握电路分析与设计的基本概念、基本原理和基本分析方法，包括：电路模型的建立、时域和频域的分析方法以及对结果的物理解释、物理意义等。

1-2：理解各种变换（傅里叶变换、拉普拉斯变换等）的基本内容、性质和应用。特别要建立电路系统的频域分析的概念以及系统函数的概念，为学生进一步学习后续课程（通信原理、数字信号处理等）打下坚实的基础。

1-3：激发学生对本专业信号与系统学科方面的兴趣与学习热情，使学生分析问题和解决问题的能力有所提高。

**2、能力目标：**

2-1：理解电路分析的概念和方法，熟练掌握电路的时域、频域以及变换域分析方法。

2-2：理解时域频域电路的概念和分类，掌握系统数学模型的建立方法，熟练掌握系统的时域、频域以及变换域分析方法。

2-3：熟练掌握电路分析方法在电子、控制等领域的工程应用。

2-4：培养科学与工程应用的意识和素质，逐步培养学生的探索精神和创新能力。

**3、德育/素养目标：**

3-1：培养具有不畏困难、锲而不舍、敢于尝试、不惧失败、迎难而上的精神，并在学习过程中培养自己的细心和耐心的勇气和精神。

3-2：激发学生对电路分析与设计方向的兴趣与学习热情，提高学生分析和解决实际工程问题的能力，为将来从事电子设备设计与研发奠定必要的基础。

3-3：提高学生思维、判断、分析与解决问题能力，形成敬业、守信、高校、精益求精的职业素养。

**表 1 课程目标与毕业要求的对应关系**

| 毕业要求 | 指标点 | 课程目标 | 关联 (H/M/L) |
|---|---|---|---|
| 1、工程知识：能够将数学、自然科学、工程基础和专业知识用于解决复杂工程问题。 | 1-2 掌握通信原理、信号与信息处理、电子电路技术等专业知识，具备通信系统功能模块设计开发能力和通信与信息系统设计开发与维护能力。 | 1-1、1-2、1-4、2-1 | H |
| 2、问题分析：能够应用数学、自然科学和工程科学的基本原理、方法和手段，识别、表达、并通过文献研究分析复杂工程问题，以获得有效结论。 | 2-1 能够应用数学、自然科学和工程科学的基本原理、方法和手段，分析、识别、表达本专业相关的复杂工程问题。 | 1-2、1-3、1-4、2-1、2-2 | M |
| 3、设计/开发解决方案：能够设计针对复杂工程问题的解决方案，设计满足特定需求的系统、单元或流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。 | 3-1 能够设计针对本专业相关复杂工程问题的解决方案，能够设计和开发实现特定功能、满足特定需求的信息传输、信号处理或网络通信系统。 | 1-3 、1-4 、2-1、2-2 | L |
| 5、使用现代工具：能够针对复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。 | 5-1 能够对本专业相关复杂工程问题进行建模与分析，理解获取相关信息参数的必要性与基本方法，并理解其局限性。 | 1-1、2-2、3-2、3-3 | H |

# 四、主要教学内容

## （一）理论教学

**第 1 章：Natural and Step Responses of RLC Circuits**（支撑教学目标 1-1、1-3、2-1）

**【1】知识点：**

(1) Introduction to the Natural Response of a Parallel RLC Circuit.

(2) The Forms of the Natural Response of a Parallel RLC Circuit.

(3) The Step Response of a Parallel RLC Circuit.

(4) The Natural and Step Response of a Series RLC Circuit.

(5) A Circuit with Two Integrating Amplifiers.

**【2】学习目标：**

理解：Introduction to the Natural Response of a Parallel RLC Circuit; The Natural and Step Response of a Series RLC Circuit.

掌握：The Forms of the Natural Response of a Parallel RLC Circuit.

**【3】重点内容：**

(1) The Forms of the Natural Response of a Parallel RLC Circuit.

(2) The Step Response of a Parallel RLC Circuit.

(3) The Natural and Step Response of a Series RLC Circuit.

**【4】难点内容：**

(1) The Step Response of a Parallel RLC Circuit.

(2) The Natural and Step Response of a Series RLC Circuit.

**【5】思政案例：**

(1) By explaining the Natural and Step Response of a parallel RLC circuits, we can further introduce their applications in our country's major heavy equipment, such as the "Two Bombs and One Satellite" project, and in recent years, the Shenzhou spacecraft, Hong Kong Zhuhai Macao Bridge, aircraft carriers, high-speed railways, etc.

(2) Strengthen patriotic education for students, promote the spirit of patriotism, and transform patriotic enthusiasm into practical actions based on positions and striving for learning. Guide college students to promote the spirit of "self-reliance and hard work". Cultivate college students' ideals, beliefs, values, and social responsibilities. Enable them to possess skills such as precise inference, comprehensive observation, and rational thinking.

**第 2 章：Sinusoidal Steady-State Analysis**（支撑教学目标 1-1、1-2、1-3、2-1）

**【1】知识点：**

(1) Concept and representation of sinusoidal steady-state power supply.

(2) Analysis of the response of the circuit under sinusoidal power.

(3) Concepts and representations of phasor methods.

(4) The Passive Circuit Elements in the Frequency Domain.

(5) Kirchhoff’s Laws in the Frequency Domain.

(6) Series, Parallel, and Delta-to-Wye Simplifications.

(7) Source Transformations and Thévenin–Norton Equivalent Circuits.

(8) The Node-Voltage Method.

(9) The Mesh-Current Method.

**【2】学习目标：**

理解：Concept and representation of sinusoidal steady-state power supply; Analysis of the response of the circuit under sinusoidal power.

掌握：The Passive Circuit Elements in the Frequency Domain; Kirchhoff’s Laws in the Frequency

Domain; The Node-Voltage Method; The Mesh-Current Method.

**【3】重点内容：**

(1) Concepts and representations of phasor methods.

(2) The Passive Circuit Elements in the Frequency Domain.

(3) Kirchhoff's Laws in the Frequency Domain.

(4) Series, Parallel, and Delta-to-Wye Simplifications.

**【4】难点内容：**

(1) Kirchhoff's Laws in the Frequency Domain.

(2) Series, Parallel, and Delta-to-Wye Simplifications.

**【5】思政案例：**

(1) By introduce the Concept and representation of sinusoidal steady-state power supply, as well as explaining Kirchhoff's law in the frequency domain, then extend to Kirchhoff, who published Kirchhoff's law at only 21 years old, to motivate students to be positive and proactive, on explore and innovate;

(2) By applying Kirchhoff's law to real-life situations, students can learn that things in life are just like laws, without rules nothings can be accomplished. They should always abide by corresponding laws and regulations and follow a series of rules.

**第 3 章：Sinusoidal Steady-State Power Calculations**（支撑教学目标 1-3、1-4、2-1、2-2）

**【1】知识点：**

(1) Instantaneous power definition.

(2) Average and Reactive Power.

(3) The rms Value and Power Calculations.

(4) Complex power calculation for a sinusoidal steady-state circuit.

(5) Definition and calculation of Maximum Power Transfer.

**【2】学习目标：**

理解：Instantaneous power definition; Average and Reactive Power; The rms Value and Power Calculations.

掌握：Complex power calculation for a sinusoidal steady-state circuit.

**【3】重点内容：**

(1) Average and Reactive Power.

(2) The rms Value and Power Calculations.

(3) Complex power calculation for a sinusoidal steady-state circuit.

(4) Definition and calculation of Maximum Power Transfer.

**【4】难点内容：**

(1) Complex power calculation for a sinusoidal steady-state circuit.

**【5】思政案例：**

(1) By introducing Sinusoidal Steady-State Power Calculation and Instantaneous power definition extend to the relativity of "leading ahead" and "lagging behind" in life, analyze the pros and cons, misfortunes and blessings

(2) A Brief Discussion on the Reactive Power Pricing Mechanism in the Electricity Market, Understanding the Development Status and Policy Direction of China's Electricity Market. Understand the Chinese economy through the development process of electricity commodities in socialism with Chinese characteristics.

**第 4 章：Balanced three-phase circuits**（支撑教学目标 1-2、1-3、1-4、2-1）

**【1】知识点：**

(1) Balanced Three-Phase Voltages.

(2) Three-Phase Voltage Sources.

(3) Analysis of the Wye-Wye Circuit.

(4) Analysis of the Wye-Delta Circuit.

(5) Power Calculations in Balanced Three-Phase Circuits.

(6) Measuring Average Power in Three-Phase Circuits.

**【2】学习目标：**

理解：How to analyze a balanced, three-phase wye-wye connected circuit; How to analyze a balanced, three-phase wye-delta connected circuit.

掌握：Calculate power (average, reactive, and complex) in any three-phase circuit.

**【3】重点内容：**

(1) Analysis of the Wye-Wye Circuit.

(2) Analysis of the Wye-Delta Circuit.

(3) Power Calculations in Balanced Three-Phase Circuits.

**【4】难点内容：**

(1) Analysis of the Wye-Delta Circuit.

(2) Measuring Average Power in Three-Phase Circuits.

**【5】思政案例：**

(1) By introducing Balanced three-phase circuits and three-phase wye-wye connected circuit, then extend to the indomitable discovery of Ohm's Law by Ohm, to cultivate the essence of students' fearlessness of difficulties.

(2) By introducing Power Calculations in Balanced Three-Phase Circuits to introduces the ups and downs of life.

**第 5 章：Introduction to the Laplace Transform**（支撑教学目标 1-2、1-3、1-4、2-1）

**【1】知识点：**

(1) Definition of the Laplace Transform.

(2) The Step Function.

(3) The Impulse Function.

(4) Functional Transforms.

(5) Operational Transforms.

(6) Applying the Laplace Transform.

(7) Inverse Transforms.

(8) Poles and Zeros of F(s).

(9) Initial- and Final-Value Theorems.

**【2】学习目标：**

理解：The definition and properties of Laplace transform; The representation of the Laplace transformation in a circuit.

掌握：Partial fraction expansion methods of inverse Laplace transform.

**【3】重点内容：**

(1) Definition of the Laplace Transform.

(2) Functional Transforms.

(3) Operational Transforms.

(4) Applying the Laplace Transform.

(5) Inverse Transforms.

**【4】难点内容：**

(1) Operational Transforms.

(2) Inverse Transforms.

(3) Initial- and Final-Value Theorems.

**【5】思政案例：**

(1) Through the definition of the Laplace transform to combining the stories of famous historical figures such as Laplace and Fourier, cultivate students' spirit of meticulousness, rigor, practicality, down-to-earth approach, and diligent research.

(2) Inspire students' patriotic spirit, continuously develop and inspire people's pursuit of science, which is endless. Inspire students to constantly pursue the spirit of progress.

**第 6 章：The Laplace Transform in Circuit Analysis**（支撑教学目标 1-2、1-3、1-4、2-1、2-2）

**【1】知识点：**

(1) Circuit Elements in the s Domain.

(2) Circuit Analysis in the s Domain.

(3) The application of Laplace transform in circuits.

(4) The Transfer Function.

(5) The Transfer Function in Partial Fraction Expansions.

(6) The Transfer Function and the Convolution Integral.

(7) The Transfer Function and the Steady-State Sinusoidal Response.

(8) The Impulse Function in Circuit Analysis.

**【2】学习目标：**

理解：Circuit Elements in the s Domain; The Transfer Function and the Convolution Integral; The Impulse Function in Circuit Analysis.

掌握：Circuit Analysis in the s Domain; The application of Laplace transform in circuits; The Transfer Function.

**【3】重点内容：**

(1) Circuit Analysis in the s Domain.

(2) The application of Laplace transform in circuits.

(3) The Transfer Function.

(4) The Transfer Function in Partial Fraction Expansions.

(5) The Transfer Function and the Convolution Integral.

(6) The Transfer Function and the Steady-State Sinusoidal Response.

**【4】难点内容：**

(1) The application of Laplace transform in circuits.

(2) The Transfer Function and the Convolution Integral.

**【5】思政案例：**

Through the application of Laplace transform in circuits to extend to the evolution of communication technology, introduce Huawei's international leading position in 5G communication technology and inspire students' patriotic enthusiasm. Inspire students' sense of national pride, the spirit of craftsmanship for continuous innovation, and the spirit of exploration in science.

**第 7 章：Frequency selective circuits**（支撑教学目标 1-2、1-3、1-4、2-1、2-2）

**【1】知识点：**

(1) Some Preliminaries.

(2) Low-Pass Filters.

(3) High-Pass Filters.

(4) Bandpass Filters.

(5) Bandreject Filters.

**【2】学习目标：**

理解：RL and RC circuits that act as low-pass or high pass filters, formulae for their cutoff frequency; RLC circuits that act as bandpass or bandreject filters, formulae for their center frequency, cutoff frequencies, bandwidth, and quality factor.

掌握：Low-Pass Filters; High-Pass Filters; Bandpass Filters; Bandreject Filters.

**【3】重点内容：**

(1) Low-Pass Filters.

(2) High-Pass Filters.

(3) Bandpass Filters.

(4) Bandreject Filters.

**【4】难点内容：**

(1) Bandpass Filters.

(2) Bandreject Filters.

**【5】思政案例：**

By introducing the related frequency selective circuits, By reviewing the achievements in China's science and technology over the past 40 years of reform and opening up, these achievements have also attracted worldwide attention. For example, the representative Chinese private enterprise Huawei, whose electronic products are sold globally, surpassed Apple phones in the third quarter of 2018, and its sales volume is far ahead in the world. It has made an indelible contribution to the economic development of the country, and its achievements are undoubtedly inseparable from the path of socialism with Chinese characteristics, the theoretical system of socialism with Chinese characteristics, and the socialist system with Chinese characteristics. The country is progressing, while people's lives are becoming increasingly prosperous. The country is paying more and more attention to education, and children have higher opportunities to receive education. The reason why we have so many people sitting in classrooms to receive higher education is inseparable from the continuous progress of the country. This further enhances students' sense of national and ethnic identity and pride, and increases their confidence in the path of socialism with Chinese characteristics, theory, and system.

**第 8 章：Active filter circuits**（支撑教学目标 1-2、1-3、1-4、2-1）

**【1】知识点：**

(1) First-Order Low-Pass and High-Pass Filters.

(2) Scaling.

(3) Op Amp Bandpass and Bandreject Filters.

(4) Higher-Order Op Amp Filters.

(5) Narrowband Bandpass and Bandreject Filters.

**【2】学习目标：**

理解：First-Order Low-Pass and High-Pass Filters.

掌握：Higher-Order Op Amp Filters.

**【3】重点内容：**

(1) First-Order Low-Pass and High-Pass Filters.

(2) Scaling.

(3) Op Amp Bandpass and Bandreject Filters.

(4) Higher-Order Op Amp Filters.

**【4】难点内容：**

(1) Op Amp Bandpass and Bandreject Filters.

(2) Higher-Order Op Amp Filters.

(3) Narrowband Bandpass and Bandreject Filters.

**【5】思政案例：**

Introducing First-Order Low-Pass and High-Pass Filters, to Combining China's world leading position in high-tech fields such as artificial intelligence, big data, and 5G communication, we aim to establish students' national pride. When discussing the development history of electronic technology and the development process of chips, lectures will be given on the deeds of Academician Deng Zhonghan, the commander-in-chief of the "Starlight China Chip Engineering", and Academician Wu Dexin, an integrated circuit expert. The development history of China's top ten chip companies such as Tsinghua Unigroup, Huawei Hisilicon, and Changdian Technology will be introduced. Through the impact of the "ZTE Crisis" and the "China US Trade War" on China's semiconductor industry, students will be inspired to understand the technological gap and understand that "independent innovation" and "core technology" are the key tools for a strong country. Especially in the face of the current turbulence in the international landscape, national development and national rejuvenation require relevant talents. This will stimulate students' patriotism and learning interest, establish a sense of professional honor and professional mission, and strengthen their ideal belief in "rejuvenating the country through science and technology". The sentence is: Contribute one's own strength to the great rejuvenation of the Chinese nation through personal practical actions.

**第 9 章：Fourier Series**（支撑教学目标 1-2、1-3、1-4、2-1、2-2）

**【1】知识点：**

(1) Fourier Series Analysis: An Overview.

(2) The Fourier Coefficients.

(3) The Effect of Symmetry on the Fourier Coefficients.

(4) An Alternative Trigonometric Form of the Fourier Series.

(5) An Application.

(6) Average-Power Calculations with Periodic Functions.

(7) The rms Value of a Periodic Function.

(8) The Exponential Form of the Fourier Series.

(9) Amplitude and Phase Spectra.

**【2】学习目标：**

理解：The definition, convergence domain and properties of Fourier transform; Definitions of system function of LTI discrete-time system.

掌握：Partial fraction expansion methods of inverse Fourier transform.

**【3】重点内容：**

(1) The Convergence of the Fourier Integral.

(2) Using Laplace Transforms to Find Fourier Transforms.

(3) Fourier Transforms in the Limit.

(4) Operational Transforms.

(5) Circuit Applications.

(6) Circuit Applications of inverse Fourier.

**【4】难点内容：**

(1) Circuit Applications.

(2) Circuit Applications of inverse Fourier.

**【5】思政案例：**

Overviewing Fourier Series Analysis and application, extend to how did Fourier persist in the face of questioning from authoritative scientists about the story of Fourier, and where did his confidence come from? The courage and perseverance to persist in exploration amidst confusion;

**第 10 章：Two-Port Circuits**（支撑教学目标 1-2、1-3、1-4、2-1、2-2）

**【1】知识点：**

(1) The Terminal Equations.

(2) The Two-Port Parameters.

(3) Analysis of the Terminated Two-Port Circuit.

(4) Interconnected Two-Port Circuits.

**【2】学习目标：**

理解：Model and circuit analysis of two-port networks.

掌握：Significance, establishment and solution of Two-Port Circuits.

**【3】重点内容：**

(1) Establishment and solution of Two-Port Circuits.

**【4】难点内容：**

(1) Establishment of Two-Port Circuits.

(2) Analysis of equation equations.

**【5】思政案例：**

(1) Through two-Port Circuits and analysis of the Terminated Two-Port Circuit, introduce the development history of signals and systems, introduce the communication system of China's first artificial Earth satellite "Dongfanghong-1", and then introduce the topic of "Two Bombs and One Satellite", calling on students to work hard and be brave in innovation. At the same time, let students understand the current situation of China's communication field, connect with the current satellite system and 5G communication system, enhance patriotism, and establish national confidence.

(2) Emphasizes the engineering design concept of "simplifying complexity", guiding students to learn how to change perspectives, fields, and solve problems from multiple perspectives and aspects in daily problem-solving.

## 五、教学安排与学时分配

**表 3 学时分配表**

| 讲　　课　　内　　容 | | 学时 | | | | |
|---|---|---|---|---|---|---|
| | | 讲课 | 实验 | 上机 | 设计 | 课外 |
| 第 1 章 | Natural and Step Responses of RLC Circuits | 6 | 0 | 0 | 0 | 0 |
| 第 2 章 | Sinusoidal Steady-State Analysis | 6 | 0 | 0 | 0 | 0 |
| 第 3 章 | Sinusoidal Steady-State Power Calculations | 6 | 0 | 0 | 0 | 0 |
| 第 4 章 | Balanced three-phase circuits | 6 | 0 | 0 | 0 | 0 |
| 第 5 章 | Introduction to the Laplace Transform | 4 | 0 | 0 | 0 | 0 |
| 第 6 章 | The Laplace Transform in Circuit Analysis | 6 | 0 | 0 | 0 | 0 |
| 第 7 章 | Frequency selective circuits | 6 | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|
| 第 8 章 | Active filter circuits | 6 | 0 | 0 | 0 | 0 |
| 第 9 章 | Fourier Series | 6 | 0 | 0 | 0 | 0 |
| 第 10 章 | Two-Port Circuits | 4 | 0 | 0 | 0 | 0 |
| 小计 | | 56 | 0 | 0 | 0 | 0 |
| 总计 | 56 | | | | | |

## 六、教学方法

1、Multi-media-based lecturing;
2、Combining theory with industrial practical problems;
3、Knowledge delivery with ethic education.

## 七、成绩评定

1、Final grade consists of 50% of regular assignments and in-class performance;
2、The other 50% of final grade will be determined by the final exam.

## 八、评价及持续改进

1、教学大纲的评价与持续改进将每 4 年进行一次，由课程负责人根据课程教学内容与人才培养目标组织课程团队讨论并修改教学大纲，报分管教学工作副院长审核后由执行院长批准。

Subject Syllabus Improvement will be held every 4 years and the subject coordinator shall be responsible for the syllabus discussion and improvement, and the revised version shall be submitted to deputy dean (teaching affairs) for reviewing then to executive dean for approvement.

2、成绩评价与持续改进将每年进行一次，由课程负责人根据课程教学内容、课堂教学效果以及成绩分布，对课程教学方法和成绩评定环节进行改进，并同步优化评定办法。

Assessment Improvement will be held every year and the subject coordinator shall revise the syllabus based on the teaching content, effect and result distribution while optimize the assessment measures.

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