**《高等数学》教学大纲**

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| **课程名称：高等数学** | | | | | | **课程类别（必修/选修）：必修** | | | | |
| **课程英文名称：Calculus** | | | | | | | | | | |
| **总学时/周学时/学分：65/5/5** | | | | | | **其中实验/实践学时：无** | | | | |
| **先修课程：高中数学** | | | | | | | | | | |
| **授课时间：** | | | | | | **授课地点：** | | | | |
| **授课对象：电商系 & 多媒体系一年级本科生** | | | | | | | | | | |
| **开课学院：粤台产业科技学院** | | | | | | | | | | |
| **任课教师姓名/职称：翁章译/副教授** | | | | | | | | | | |
| **答疑时间、地点与方式：周一5-6节、周四1-3节 实315** | | | | | | | | | | |
| **课程考核方式：作业（V） 随堂考 (V) 期中考（V） 期末考（V） 出勤（V）** | | | | | | | | | | |
| **使用教材：James Stewart, Calculus, 7th Edition.**  **教学参考资料：高等数学, 同济大学数学系, 第七版°** | | | | | | | | | | |
| **课程简介：高等数学是我校的一门重要的基础理论课程。通过本课程的学习,使学生系统地获得一元函数微积分等基本知识和基本理论；本课程重点学习函数、极限、导数、积分（不定积分、定积分）、微分方程,并注重培养学生熟练的运算能力和较强的抽象思维能力﹑逻辑推理能力﹑几何直观和空间想象能力，从而使学生学会利用基础数学知识去分析和解决一些工程﹑几何﹑力学和物理等方面的实际问题,为学习后续课程和进一步扩大数学知识奠定必要的数学基础。** | | | | | | | | | | |
| **课程教学目标**  **一、知识目标：**  **1.能理解极限的定义及如何做计算,分析连续的定义及其运用特性,探讨水平和垂直渐近线,综合所有基础观念来定义微分的概念;**  **2.具有微分的概念,适当地运用在多项式,指数函数,三角函数,对数函数之微分；分析乘积,商数和连锁法则；综合所有法则及对一些函数求导数进而计算其隐函数之微分;**  **3.能理解函数之最大,最小,极大,极小和临界点之定义,运用罗尔斯及中间值定理,和不定式及罗毕达法则去分析函数之特性进而描绘其图形；正确地计算函数之反导数;**  **4. 具有积分的概念，能明了面积和积分的关系，运用微积分的基本定理去计算微分和积分的应用问题，运用积分技巧变量变换法则去计算不定积分和定积分计算问题;综合所有观念来定义积分的概念。**  **二、能力目标：**  **1. 学会极限的定义和计算,学会连续的定义和特性,能应用在工程科学的生活层面上；**  **2. 学会微分的概念，并应用在工程科学的生活层面上。**  **三、素质目标：**  **1. 培养学生具有主动参与、积极进取、崇尚科学、探究科学的学习态度和思想意识；**  **2. 养成理论联系实际、科学严谨、认真细致、实事求是的科学态度和职业道德。** | | | | | | | **本课程与学生核心能力培养之间的关联(授课对象为理工科专业学生的课程填写此栏）：**  **V核心能力1.应用数学、基础科学和电商系和多媒体系专业知识的能力。**  **□核心能力2.设计与执行实验,以及分析与解释数据的能力。**  **V核心能力3.电商系和多媒体系领域所需技能、技术以及使用软硬件工具的能力。**  **□核心能力4.机械工程系统、零部件或工艺流程的设计能力。**  **□核心能力5.项目管理、有效沟通协调、团队合作及创新能力。**  **V核心能力6.发掘、分析与解决复杂电商系和多媒体系问题的能力。**  **V核心能力7．认识科技发展现状与趋势,了解电商系和多媒体系技术对环境、社会及全球的影珦,并培养持续学习的习惯与能力。**  **V核心能力8．理解职业道德、专业伦理与认知社会责任的能力。** | | | |
| **理论教学进程表** | | | | | | | | | | |
| **周次** | **教学主题** | **主讲教师** | **学时数** | **教学的重点、难点、课程思政融入点** | | | **教学模式**  **（线上/混合式/线下** | **教学方法** | | **作业安排** |
| 4 | **1.5 Exponential Functions**  **1.6 Inverse Functions and Logarithms** | 翁章译 | 5 | **Key Point: Learn some exponential, inverse functions and logarithms.**  **Difficulty: Be careful to compute the limit of a function.**  **课程思政融入点：介绍高数史的演变过程，历代伟人的巨大贡献，培养学生的爱国精神。** | | | **线下** | **讲授** | | **Exercises 1.5, 1.6**  **课程思政作业：要求学生每人至少阅读两篇与高数发展有关的文章或书籍** |
| 5 | **2.2 The Limit of a Function**  **2.3 Calculating Limits Using the Limit Laws**  **2.4 The Precise Definition of a Limit** | 翁章译 | 5 | **Key Point: Learn the definition of the limit and learn how to compute the limit.**  **Difficulty: Using the precise definition to prove the limit.**  **课程思政融入点：介绍极限的定义，历代利用极限在生活的应用，培育学生的科学探索精神和创新意识°** | | | **线下** | **讲授** | | **Exercises 2.2, 2.3 & 2.4**  **课程思政作业：要求学生每人至少阅读两篇与高数发展有关的文章或书籍** |
| 6 | **2.5 Continuity**  **2.6 Limits at Infinity; Horizontal Asymptotes** | 翁章译 | 5 | **Key Point: Learn the definition of the continuity and some properties; Learn the definition of horizontal asymptotes.**  **Difficulty: Show the continuous function on the interval and find horizontal asymptotes .**  **课程思政融入点：介绍连续的定义，历代利用连续在生活的应用，注重把辩证唯物主义、历史唯物主义贯穿渗透到专业课教学中°** | | | **线下** | **讲授** | | **Quiz 1**  **Exercises 2.5, 2.6**  **课程思政作业：要求学生每人至少阅读两篇与高数发展有关的文章或书籍** |
| 7 | **2.7 Derivatives and Rates of Change**  **2.8 The Derivative as a Function** | 翁章译 | 5 | **Key Point: Learn the definition of horizontal asymptotes and derivatives.**  **Difficulty: Using the precise definition to prove horizontal asymptotes and be careful to compute the higher derivatives.**  **课程思政融入点：介绍微分的定义，历代利用微分在生活的应用，引导学生增强人与自然环境和谐共生意识，明确当代大学生的历史担当°** | | | **线下** | **讲授** | | **Exercises 2.7, 2.8**  **课程思政作业：要求学生每人至少阅读两篇与高数发展有关的文章或书籍** |
| 8 | **3.1 Derivatives of Polynomials and Exponential Functions**  **3.2 The Product and Quotient Rules** | 翁章译 | 5 | **Key Point: Learn how to compute derivatives of polynomials and exponential functions, then get some rules of product and quotient.**  **Difficulty: Be careful to compute the derivative functions using product and quotient rules.**  **课程思政融入点：培养学生认真细致、一丝不苟的工作作风；培养学生精益求精的工匠精神。** | | | **线下** | **讲授** | | **Exercises 3.1, 3.2** |
| 9 | **3.3 Derivatives of Trigonometric Functions**  **3.4 The Chain Rule** | 翁章译 | 5 | **Key Point: Learn how to compute derivatives of trigonometric functions and Chain Rule.**  **Difficulty: Be careful to compute the derivatives of trigonometric functions.**  **课程思政融入点：在三角函数的微分中培养学生不断实践、勇力探索、不怕失败、战胜困难的精神。** | | | **线下** | **讲授** | | **Quiz 2**  **Exercises 3.3, 3.4** |
| 10 | **Mid-Term Test** | 翁章译 | 5 | **Mid-Term Test** | | | **线下** | **None** | | **None** |
| 11 | **3.5 Implicit Differentiation** | 翁章译 | 5 | **Key Point: Learn implicit differentiation and how to compute derivatives of inverse trigonometric functions.**  **Difficulty: Be careful to compute derivatives of inverse trigonometric functions.**  **课程思政融入点：介绍隐函数的微分，历代利用隐函数求导在生活的应用，培育学生的科学探索精神和创新意识°** | | | **线下** | **讲授** | | **Exercise 3.5** |
| 12 | **3.6 Derivatives of Logarithmic Functions**  **3.10 Linear Approximations and Differentials** | 翁章译 | 5 | **Key Point: Learn the derivative of logarithmic functions and linear approximate differentiation.**  **Difficulty: Be careful to compute derivatives of logarithmic functions and linear approximation differentiation.**  **课程思政融入点：培养学生认真细致、一丝不苟的工作作风；培养学生精益求精的工匠精神。** | | | **线下** | **讲授** | | **Exercises 3.6, 3.10** |
| 13 | **4.1 Maximum and Minimum Values**  **4.2 The Mean Value Theorem** | 翁章译 | 5 | **Key Point: Learn absolute maximum and minimum; local maximum and minimum; critical numbers; Learn Rolle’s theorem and the Mean Value theorem.**  **Difficulty: How to find absolute and local values of functions and apply the Rolle’s theorem and mean value theorem.**  **课程思政融入点：在均值定理的证明中培养学生不畏繁琐、对证明反复修改、思考的能力。** | | | **线下** | **讲授** | | **Quiz 3**  **Exercises 4.1, 4.2** |
| 14 | **4.3 How Derivatives Affect the Shape of a Graph**  **4.4 Indeterminate Forms and L’Hospital’s Rule**  **4.5 Summary of Curve Sketching** | 翁章译 | 5 | **Key Point: Learn how to draw the graphs of some functions; Compute the derivatives using indeterminate form and L’Hospital’s rule.**  **Difficulty: Be careful to sketch the graph according to the first and second derivative tests and adapt indeterminate form and L’Hospital’s rule.**  **课程思政融入点：在洛必达法则中培养学生不断实践、勇力探索、不怕失败、战胜困难的精神。** | | | **线下** | **讲授** | | **Assignment 1**  **Exercises 4.3, 4.4, 4.5** |
| 15 | **4.9 Antiderivatives**  **5.1 Areas and Distances**  **5.2 The Definite Integral** | 翁章译 | 5 | **Key Point: Learn how to compute antiderivatives and connections between areas and integral.**  **Difficulty: Be careful to compute antiderivatives of functions and definite integral.**  **课程思政融入点：介绍反导函数的定义和定积分与面积的关系，历代利用定积分去计算面积在生活的应用，培育学生的科学探索精神和创新意识°** | | | **线下** | **讲授** | | **Quiz 4**  **Exercises 4.9, 5.1, 5.2** |
| 16 | **5.3 The Fundamental Theorem of Calculus**  **5.4 Indefinite Integrals and the Net Change Theorem**   * 1. **The Substitution Rule** | 翁章译 | 5 | **Key Point: Learn the fundamental theorem of Calculus and how to compute indefinite integrals using the substitution ruls.**  **Difficulty: Be careful to understand the fundamental theorem of Calculus and compute indefinite integrals.**  **课程思政融入点：介绍重要的微积分基本定理和如何利用变量变换法则去计算不定积分函数，历代伟人的巨大贡献，培养学生的爱国精神。** | | | **线下** | **讲授** | | **Exercises 5.3, 5.4, 5.5** |
| **合计：** | | | 65 |  | | |  |  | |  |
| **考核方法及标准** | | | | | | | | | | |
| **考核形式** | | | | | **评价标准** | | | | **权重** | |
| **Attendance** | | | | | **No arrive late, no leave early, no absence.** | | | | **10%** | |
| **Assignment** | | | | | **Hand in assignments on time and no plagiarism.** | | | | **10%** | |
| **Quiz** | | | | | **Scores according to standard answers** | | | | **20%** | |
| **Mid-Term Test** | | | | | **Scores according to standard answers** | | | | **30%** | |
| **Final Test** | | | | | **Scores according to standard answers** | | | | **30%** | |
| **大纲编写时间：2020.08.11** | | | | | | | | | | |
| **系（部）审查意见：**  系（部）主任签名：  日期： 年 月 日 | | | | | | | | | | |