**《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： 实202** | | | | | | | | | |
| **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）,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数学知识去分析法和解决一些几何﹑设计﹑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之概念;**  **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,对数函数和三角函数之微分；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；具备牛顿法之概念进而求解方程式；正确地计算函数之反导数。**  **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** | | **学时数** | **教学的重点、难点、课程思政融入点** | | | **教学方式** | | **作业安排** |
| **4** | **1.5 Exponential Functions**  **1.6 Inverse Functions and Logarithms** | | **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。** | | | **teach** | | **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.** | | **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°** | | | **teach** | | **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.** | | **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°** | | | **teach** | | **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.** | | **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°** | | | **teach** | | **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.** | | **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。** | | | **teach** | | **Exercises 3.1, 3.2** |
| **9** | **3.3 Derivatives of Trigonometric Functions.**  **3.4 The Chain Rule** | | **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。** | | | **teach** | | **Quiz 2**  **Exercises 3.3, 3.4** |
| **10** | **Mid-Term Test** | | **5** | **Mid-Term Test** | | | **None** | |  |
| **11** | **3.5 Implicit Differentiation** | | **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°** | | | **teach** | | **Exercise 3.5** |
| **12** | **3.6 Derivatives of Logarithmic Functions.**  **3.10 Linear Approximations and Differentials** | | **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。** | | | **teach** | | **Exercises 3.6, 3.10** |
| **13** | **4.1 Maximum and Minimum Values**  **4.2 The Mean Value Theorem** | | **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。** | | | **teach** | | **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.** | | **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。** | | | **teach** | | **Assignment 1**  **Exercises 4.3, 4.4** |
| **15** | **4.5 Summary of Curve Sketching.**  **4.7 Optimization Problems**  **4.9 Antiderivatives** | | **5** | **Key Point: Learn how to draw curves of functions and compute antiderivatives.**  **Difficulty: Be careful to sketch curves and compute antiderivatives of functions.**  **课程思政融入点：介绍函数图形的画法，历代利用函数图形在生活的应用，培育学生的科学探索精神和创新意识°** | | | **teach** | | **Quiz 4**  **Exercises 4.5, 4.7, 4.9** |
| **16** | **5.1 Areas and Distances**  **5.2 The Definite Integral** | | **5** | **Key Point: Learn the relationshio between areas and the definite integral.**  **Difficulty: Be careful to compute areas and the definite integral.**  **课程思政融入点：介绍定积分与面积的关系，历代伟人的巨大贡献，培养学生的爱国精神。** | | | **teach** | | **Exercises 5.1, 5.2** |
| **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：2019.09.11** | | | | | | | | | |
| **系（部）审查意见：**  时维宁  系（部）主任签名： 日期： 年 月 日 | | | | | | | | | |