《高等数学》课程教学大纲

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：96/6/6	其中实验/实践学时：无
先修课程：高中数学	
授课时间：星期一 5-7 节，星期三 1-3 节	授课地点：实 314，实 315
授课对象：自动化系 & 机械系一年级本科生	
开课学院：粤台学院	
任课教师姓名/职称：翁章译/副教授	
答疑时间、地点与方式：星期四 5-6 节，实 202	
课程考核方式：开卷（）闭卷（√）课程论文（）其它（）	
使用教材：James Stewart, Calculus, 7th Edition.	
教学参考资料：Finney and Thomas, Calculus, 2nd Edition.	
课程简介：高等数学是高等学校各专业的一门重要基础课程,它是工程数学,统计机率,微分几何等学科之基础,应用层面也非常广泛,主要有工程科学、自然科学、社会科学、金融学、医学等各个领域。高等数学课程的学习,不仅为学生后继专业课的学习打下必要的数学基础,而且还能促进学生的抽象思维和提高学生的推理能力,更能进一步地应用在自己专业领域上及生活实例上，是一门实用且应用广泛之数学基础必修课程。	

课程教学目标	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)：
1. 能理解积分的定义和面积的关系，以及如何对定积分和不定积分之计算,明了高数第一和第二基本定理之概念，以及微分和积分之关系和定理应用之计算。 2. 利用积分去计算两曲线所围成之面积，圆柱体体积，圆柱体薄壳体积，函数之平均值，弧长所形成面积及其旋转之体积。 3. 运用各种积分技巧去计算定积分和不定积分两种型式包括变量变换法则，分部积分，三角函数替换法，有理式函数之部分分式分解；学习利用近似积分技巧去计算积分之近似值和瑕积分等问题。 4. 学习利用积分技巧解微分方程式包括可分离式方程式和线性方程式等问题。	☑核心能力 1. 应用数学、基础科学和机械设计制造及其自动化专业知识能力； ☐核心能力 2. 设计与执行机械设计制造及其自动化专业相关实验，以及分析与解释相关数据的能力； ☑核心能力 3. 机械工程领域所需技能、技术以及实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； ☑核心能力 6. 发掘、分析与解决复杂机械工程问题的能力； ☑核心能力 7. 认识科技发展现状与趋势，了解工程技术对环境、社会及全球的影响，并培养持续学习的习惯与能力； ☑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。

<table>
<tr><td colspan="6" align="center">理论教学进程表</td></tr>
<tr>
<td>周次</td>
<td>教学主题</td>
<td>教学时长</td>
<td>教学的重点与难点</td>
<td>教学方式</td>
<td>作业安排</td>
</tr>
<tr>
<td>1</td>
<td>5.1 Areas and Distances</td>
<td>6</td>
<td>**Key Point: Learn some areas, distances and the relationship between the integral and areas.**
Difficulty: How to connect the relationship between areas and integrals.</td>
<td>teach</td>
<td>**Exercise 5.1**</td>
</tr>
<tr>
<td>2</td>
<td>5.2 The Definite Integral</td>
<td>6</td>
<td>**Key Point: Learn the definition of the definite integral.**
Difficulty: How to compute the definite integral.</td>
<td>teach</td>
<td>**Exercise 5.2**</td>
</tr>
<tr>
<td>3</td>
<td>5.3 The Fundamental Theorem of Calculus</td>
<td>6</td>
<td>**Key Point: Learn the fundamental theorem of Calculus and apply theorems to solve problems.**
Difficulty: Understand two theorems and what is the difference between them.</td>
<td>teach</td>
<td>**Exercise 5.3**</td>
</tr>
<tr>
<td>4</td>
<td>5.4 Indefinite Integrals and the Net Change Theorem
5.5 The Substitution Rule</td>
<td>6</td>
<td>**Key Point: Learn the definition of the indefinite integral and the substitution rule.**
Difficulty: Be careful to compute the definite and indefinite integrals using the substitution rule.</td>
<td>teach</td>
<td>**Exercises 5.4, 5.5**</td>
</tr>
<tr>
<td>5</td>
<td>6.1 Areas Between Cures</td>
<td>6</td>
<td>**Key Point: Learn areas between curves and logarithm defined as an integral.**
Difficulty: Be careful to compute areas between curves and some laws of logarithms using the fundamental theorem of Calculus.</td>
<td>teach</td>
<td>**Exercise 6.1**</td>
</tr>
<tr>
<td>6</td>
<td>6.2 Volumes</td>
<td>6</td>
<td>**Key Point: Learn volumes and apply the integral to compute volumes.**
Difficulty: Image the figures of volumes and be careful to calculate volumes.</td>
<td>teach</td>
<td>**Exercise 6.2**</td>
</tr>
<tr>
<td>7</td>
<td>6.3 Volumes by Cylindrical Shells</td>
<td>6</td>
<td>**Key Point: Learn volumes by cylindrical shells.**
Difficulty: Be careful to compute volumes of cylindrical shells and distinguish the difference between cylinders and cylindrical shells.</td>
<td>teach</td>
<td>**Exercise 6.3**</td>
</tr>
<tr>
<td>8</td>
<td>6.5 Average Value of a Function
7.1 Integration by Parts</td>
<td>6</td>
<td>**Key Point: Learn the average value of a function and integration by parts.**
Difficulty: Understand the average value of a function and be careful to compute the definite</td>
<td>teach</td>
<td>**Exercises 6.5, 7.1**</td>
</tr>
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			and indefinite integrals using the integration by parts.		
9	**7.2 Trigonometric Integrals**	6	**Key Point: Learn the trigonometric integrals.** **Difficulty: Be careful to compute indefinite integrals about powers and product of trigonometric functions.**	teach	**Exercise 7.2**
10	**Mid-Term Test**	6	**Mid-Term Test**	test	**None**
11	**7.3 Trigonometric Substitution**	6	**Key Point: Learn the trigonometric substitution.** **Difficulty: Be careful to compute the indefinite integral using the trigonometric substitution.**	teach	**Exercise 7.3**
12	**7.4 Integration of Rational Functions by Partial Fractions**	6	**Key Point: Learn the integration of rational functions by partial fractions.** **Difficulty: Be careful to compute the indefinite integral of rational functions using partial fraction decomposition.**	teach	**Exercise 7.4**
13	**7.7 Approximate Integration**	6	**Key Point: Learn the approximation integration.** **Difficulty: Be careful to compute the definite integral using some approximations such as left (right) endpoint, midpoint rule, trapezoidal rule, Simpson's rule approximations.**	teach	**Exercise 7.7**
14	**7.8 Improper Integrals**	6	**Key Point: Learn improper integrals and some tests such as comparison test and limit comparison test.** **Difficulty: Be careful to compute improper integrals using some tests.**	teach	**Exercise 7.8**
15	**8.1 Arc Length** **8.2 Area of a Surface of Revolution**	6	**Key Point: Learn the arc length and the area of a surface of revolution.** **Difficulty: How to compute the arc length using differentiation and integration; formulae about areas of surfaces of revolution using x, y axes, respectively; learn polar coordinates.**	teach	**Exercises 8.1, 8.2**
16	**9.3 Separable Equations** **9.5 Linear Equations**	6	**Key Point: Learn separable equations and linear equations.** **Difficulty: Be careful to solve differential equations using the separation and the integration factor.**	teach	**Exercises 9.3, 9.5**
	合计：	96			

成绩评定方法及标准		
考核形式	评价标准	权重
Mid-Term Test	**Scores according to standard answers**	**30%**
Final Test	**Scores according to standard answers**	**30%**
Competition Test	**Scores according to standard answers**	**10%**
Quiz	**Scores according to standard answers**	**30%**

大纲编写时间：**2019.3.11**

系（部）审查意见：

系（部）主任签名：日期：年月日