



Course description

Course No.	1900805W	College	Science	Dept.	Mathematics
Teacher	王彤 (Tong Wang)				
Time	2018.06.25—2018.07.27				
Course Name	English	Calculus for engineering sciences II			
	Chinese	工科微积分 II			
Course credit hours	Total	Theory	Office Hour or Practice	Credits	
	60	50	10	4.0	

Course description: Describe the nature, academic status, and aims of the course (theory, ability and technique)

1. Course nature and academic status

This is the second of three courses in the engineering calculus sequence. Topics include integration methods and applications, infinite series, polar coordinates, parametric equations, vectors in plane and space, and lines and planes in space.

2. Course aims (theory, ability and technique)

(1). Students will be able to use various integration methods:

- a. Find volumes of solids of revolution by disks and cylindrical shells.
- b. Find work and average value of a function.
- c. Perform integration by parts, trigonometric substitution, and integration by partial fractions.
- d. Use parametrically defined curves to find tangents, areas, arc-lengths and surface areas of surfaces of revolution.

(2) Students will be able to analyze the properties of sequences and infinite series. Students will display proficiency by demonstrating the following competencies:

- a. Define and evaluate limits of sequences of numbers.
- b. Determine whether a sequence is bounded or unbounded. Find the Least Upper Bound lower bound and the Greatest Lower Bound of a sequence.
- c. Find the formula of an infinite series given by numbers.
- d. Determine whether a series of nonnegative terms is convergent or divergent.
- e. Determine whether an alternating series is convergent or divergent.
- f. Find the interval and radius of convergence of a power series.

g. Write Taylor and Maclaurin series of a given single-variable function.

(3). Students will be able to sketch the graphs using polar coordinates and utilize integration techniques to find areas bounded polar functions. Students will display proficiency by demonstrating the following competencies:

- a. Identify and plot points in polar coordinates.
- b. Find rectangular (polar) coordinates when a point or function is given in polar (rectangular) coordinate system.
- c. Sketch the graphs of simple polar functions.
- d. Find areas bounded by polar graphs using integration.

(4). Students will be able to perform basic vector calculus. Students will display proficiency by demonstrating the following competencies:

- a. Plot vectors in plane and in space.
- b. Find length of a vector.
- c. Find the unit vector in the direction of a vector.
- d. Find velocity and acceleration of motion using vectors.
- e. Find the angle between two vectors.
- f. Perform the calculation of the dot and the cross product.
- g. Find lines and planes in space.

Requirements for courses; ability and knowledge in advance

The prerequisites are motivation and a good working knowledge of calculus for engineering sciences (1).

Course structure explanation:

Make clear the necessary parts, optional parts, distribution of hours. Courses with experiments or practice are expected to explain credit hours needed, content, scheme and functions.

1. Introduction, review, and areas between curves (1 credit hour)
2. Volumes of solids of revolution by disks and cylindrical shells (2 credit hours)
3. Work and average value of a function (1 credit hour)
4. Integration by parts and trigonometric integrals (3 credit hours)
5. Trigonometric substitution (2 credit hours)
6. Integration by partial fractions (2 credit hours)
7. Integration using tables and approximate integration (1 credit hour)
8. Improper integrals and arc-length (2 credit hours)
9. Areas of surfaces of revolution (1 credit hour)
10. Applications of integration to physics, engineering, economics, biology and probability (2 credit hours)
11. Parametrically defined curves including tangents, areas, arc-lengths and surface areas of surfaces of

- revolution (4 credit hours)
- 12. Polar coordinates including polar curves, tangents, areas, and arc-lengths (4 credit hours)
- 13. Sequences (1 credit hour)
- 14. Series, the integral test and estimating sums (2 credit hours)
- 15. Comparison tests and alternating series. Absolute convergence and root tests (4 credit hours)
- 16. Power series and the functions they define. Taylor and McLaurin series and applications of Taylor polynomials (2 credit hours)
- 17. Three-dimensional space and vectors (1 credit hour)
- 18. The dot product and cross product (1 credit hour)
- 19. Equations of lines and planes (2 credit hours)
- 20. Review (2 credit hours)

Teaching methods (Lectures, practice, etc.)

Lectures and self-study

Forms of evaluation and requirements
Structure of the final grade(including presence, class performance,), focus of exam, forms of exam(test, interview, final report, etc)

Homework and final exam

	Name	Publisher	Author	Year	Price
Textbook	Thomas' Calculus (Part II)	Higher Education Press	Finney, Weir, Giordano	2004	¥50
References					
Website					
Course members					
College					