

SUBJECT OUTLINE DETAILS

- 1. Subject** : **Calculus I & II**
- **Code** : MT132C
- **Credits** : **6**
- **Hours** : 90 theory hours and 180 self-study hours.

2. Management Unit:

- **Department** : Mathematics
- **College/Institute** : College of Natural Sciences

3. Prerequisites: none

4. Subject objectives:

This course aims to supply students with most basic knowledge about Advanced Mathematics such as systems of equations, functions, limits, differentiation, integrals, ordinary differential equations and functions of several variables. Through out the obtained knowledge, students can solve the real-world problems and study courses relating to mathematics.

4.1 Knowledge:

- 4.1.1. Solving the system of linear equations
- 4.1.2. Function
- 4.1.3. Limit
- 4.1.4. Continuity
- 4.1.5. Derivative
- 4.1.6. Integral
- 4.1.7. Ordinary differential equations
- 4.1.8. Function of several variables

4.2. Skills:

- 4.2.1. Analysis and synthesis skills.
- 4.2.2. Systematization and modeling skills.
- 4.2.3. Computation skill.
- 4.2.4. Applied skill.
- 4.2.5. Observation skill.
- 4.2.6. Thinking skill.

- 4.2.7. Presentation skill.
- 4.2.8. Using informatics skill.
- 4.2.9. Organization skill.
- 4.2.10. Team work skill.

4.3. Attitude:

- 4.3.1. Seriousness and responsibility in study.
- 4.3.2. Faithful in study.
- 4.3.3. Independent study.

5. Brief description of subject content:

This course aims to supply the student with basic knowledge about Advanced Mathematics such as systems of linear equations, function, limits, differentiation, integration, ordinary differential equations and function of several variables.

6. Subject content structure:

	Content	Hours	Aims
Chapter 1.	System of linear equations	12	4.1.1
1.1.	System of linear equations and augmented matrices.	2	4.1.1, 4.2.7
1.2.	Solving system of linear equations by Gauss-Jordan elimination.	3	4.1.1, 4.2.2, 4.2.4, 4.2.5
1.3.	Solving system of linear equations by inverse matrix.	4	4.1.1, 4.2.2, 4.2.4, 4.2.5
1.4.	Solving system of linear equations by determinate.	3	4.1.1, 4.2.2, 4.2.4, 4.2.5
Chapter 2.	Function - Limit - Continuity	18	
2.1.	Real number set	2	4.2.6, 4.2.7
2.2.	Function	4	4.1.2
	- The concept of function		4.2.5, 4.2.7
	- Properties of functions: monotonic function, bounded function, even-odd function, periodic function		4.2.2, 4.2.7
	- Addition, subtraction, multiplication, diversion of functions; composite function and inverse function.		4.2.2, 4.2.7
	- Basic elementary functions and basic functions		4.2.7
2.3.	Limit	9	4.1.3
	- Limit of a function at a point		4.2.2, 4.2.4, 4.2.7
	- One-side limits		4.2.4, 4.2.7
	- Basic limits and indeterminate form		4.2.2, 4.2.4, 4.2.7

2.4.	Continuity	3	4.2.2, 4.1.4, 4.2.5
Chapter 3.	Derivative	18	4.1.5
3.1.	Definition of derivative, tangent line and slope	1	4.2.7
3.2.	One-side derivatives	1	4.2.2, 4.2.7
3.3.	Derivative on an interval	1	4.2.2, 4.2.7
3.4.	The relationship between differentiation and continuity	1	4.2.2, 4.2.7
3.5.	Differentiation rules	1	4.2.2, 4.2.4
3.6.	Derivative of composite function and inverse function	1	4.2.2, 4.2.4
3.7.	Derivative of implicit function	1	4.2.2, 4.2.4
3.8.	Derivative of basic elementary function	1	4.2.2, 4.2.7
3.9.	Higher derivatives.	1	4.2.2, 4.2.7
3.10.	Differential.	1	4.2.2, 4.2.7, 4.2.9
3.11.	Mean value theorems.	1	4.2.2, 4.2.5
3.12.	L' Hospital Rule	2	4.2.2, 4.2.4
3.13.	Taylor formula	1	4.2.4, 4.2.7
3.14.	Extrema	1	4.2.2, 4.2.4, 4.2.5
3.15.	Absolute minima and absolute minima	2	4.2.4, 4.2.5, 4.2.7
3.16	Rates of change	1	4.2.2, 4.2.4, 4.2.5, 4.2.7
Chapter 4	Integral	18	4.1.6
4.1.	Indefinite integrals.	6	4.2.7
	- Antiderivative and indefinite integrals.		4.2.2, 4.2.7
	- Rules for evaluating indefinite integral: change of variables, integration by part.		4.2.2, 4.2.4, 4.2.7
4.2.	Definite integrals	8	4.2.7
	- Definition of definite integral and its properties		4.2.7
	- Newton-Leibnitz formula		4.2.2, 4.2.4, 4.2.7
	- Rules for evaluating indefinite integral: change of variables, integration by part.		4.2.2, 4.2.4, 4.2.7, 4.2.9
	- The application of definite integral: areas, volume, total change of a quantity		4.2.4, 4.2.5, 4.2.7
4.3.	Improper integrals	4	4.2.2, 4.2.4, 4.2.7
Chapter 5	Ordinary differential equations	12	4.1.7
5.1.	Concept of ordinary differential equations	2	
5.2.	Separable equations	1	4.2.4, 4.2.5
5.3.	Homogeneous equations	1	4.2.4, 4.2.5
5.4.	First-order linear equations	2	4.2.4, 4.2.5
5.5.	Bernoulli equations	1	4.2.4, 4.2.5
5.6.	Exact equations	2	4.2.4, 4.2.5

5.7.	Second-order linear equations with constant coefficients	3	4.2.2, 4.2.4, 4.2.5
Chapter 6	Function of several variables	12	4.1.8
6.1.	Concept of function of several variables	2	4.1.8, 4.2.7
6.2.	Limit, continuity	2	4.2.7
6.3.	Partial derivative and higher partial derivatives	2	4.2.4
6.4.	Differential	2	4.2.7
6.5.	Extrema of function of several variables	2	4.2.2, 4.2.4, 4.2.5, 4.2.7
6.6.	Absolute minima and absolute maxima	2	4.2.2, 4.2.4, 4.2.5, 4.2.7

7. Teaching method:

- Discovery learning method.
- Presentation method.
- PowerPoint presentation method.
- Analysis and synthesis method.
- Presentation method combining with using computer.
- Audio-visual method.

8. Duties of student:

Students should be carried out the following responsibilities:

- Taking part in at least 80% theory hours.
- Completing assignments.
- Taking part in middle exam.
- Taking part in final exam.
- Realizing private study.

9. Assessment of student learning outcomes:

9.1. Assessment:

Students are evaluated by the following components:

No	Marks	Stipulation	Weight	Aims
1	Marks for diligence	Taking part hours/ total hours	5%	4.3.1, 4.3.3
2	Marks for exercises	Complete exercises / assignment	5%	4.2.3, 4.3.1, 4.3.3
3	Marks for middle exam	Multiple choice (30 minutes)	25%	4.2.3, 4.3.1, 4.3.3
4	Marks for final exam	- Write (150 minutes) - Taking part in 80% of theory hours. - Requirement	65%	4.2.3, 4.3.1, 4.3.3

9.2. Grading:

- Mark scale for components and final exam is of one to ten.
- Course is evaluated by grades.

10. Materials:

Books	Special number
[1] Vi tích phân- Tập 1 / Nguyễn Hữu Khánh.- Hà Nội: Giáo dục, 2009.- 203 tr., 24 cm.- 515/ Kh107/T.1 - 515/ Kh107/T2	TQ005572, SP.005553, SP.005523, SP.005568
[2] Giáo trình vi tích phân TN002 Dùng cho sinh viên ngành kỹ thuật / Nguyễn Hữu Khánh.- 1st.- Cần Thơ : Trường Đại học Cần Thơ, Khoa Khoa học , 1997 .- 515/ Kh107/T2 - 515/ Kh107/T2	TQ005572, SP.005553
[3] Toán học cao cấp; T1/ Nguyễn Đình Trí - Hà Nội : ĐH và THCN, 1986 - 515/ Tr300/T1	SP.005191, MOL.026375
[4] Toán học cao cấp; T2 / Nguyễn Đình Trí. - Hà Nội : ĐH và THCN, 1991 - 515.076/ Tr300/T2	SP.005206
[5] Calculus : A complete course / Robert Alexander Adams. - Don Mills, Ontario : Addison-Wesley, 1990 - 515/ A217	DIG.002722
[6] Calculus : Ideas and applications / Alex Himonas, Alan Howard. - New York : John Wiley, 2003 - 515.21/ H657	MOL.051308, MON.022862
[7] Calculus / Montry J. Strauss. - New York : Pearson, 2002 - 515/ S912	AV.001965, MON.047241
[8] Calculus for biology and medicine / Claudia Neuhauser. - Upper Saddle River, NJ : Pearson Education, 2004 - 570.15195/ N485	KH.000805
[9] Introduction to Calculus with applications / Stanley J. Farlow, Gary M. Haggard. - New York : McGraw-Hill, 1990 - 515/ F233	KH.001932, KH.001683
[10] Calculus with applications / Margaret L. Lial, Raymond N. Greenwell, Nathan P. Ritchey. - Boston : Pearson, 2012 - 515/ L693	SP.020796
[11] Advanced Calculus / Wilfred Kaplan. - Reading, Massachusetts : Addison-Wesley, 1991 - 515/ K17	MON.005473

11. Self-study Guide:

Week	Content	Theory and Exercises (hour)	Practice (hour)	Students' s task
1	Chapter 1: System of linear equations 1.1. System of linear equations and augmented matrices. 1.2. Solving system of linear equations by Gauss-Jordan elimination.	12		- Preview: + Books [3] : chapter 1. + Search: System of linear equations in book [11]. - Solve exercises 1- 5 of chapter 1 in book [3] and exercises 1- 8 of chapter 1 in book [11].
2	1.3. Solving system of linear equations by inverse matrix. 2.2. Solving system of linear equations by determinate.	12		- Preview: + Books [3]: sections 2.1 and 2.2 of chapter 1. + Review: sections 1.1 and 1.2 of chapter 1 in lecture note; chapter 1 in [11] + Search: Solve system of linear equations

				by Gauus-Jordan elimination. - Solve exercises 5 - 12 of chapter 1 in book [3] and exercises 6 - 10 of chapter 1 in book [11].
3	Chapter 2: Function - Limit - Continuity 2.1. Real number set. 2.2. Functions 2.3. Limits	12		- Preview: + Book [1]: section 1.1 - 1.3 of chapter 1. + Search: Function, limit in books [3], [5] [7], [8] and [10]. - Solve exercises - 10 of chapter 1 in book [1].
4	2.3. Limits (continue)	12		- Preview: + Books [1]: section 1.3. + Search: Limit in book [5], [6] and [8]. - Review: sections 2.1 and 2.3 of lecture note. - Solve exercises 11 - 19 of chapter 1 in book [1].
5	2.3. Limits (continue) 2.4. Continuity	12		- Preview: + Books [1]: section 1.4. + Search: Continuity in books [5] - [10]. + Review: section 2.3 of lecture note. - Solve exercises 20 - 26 of chapter 1 in book [1].
6	Chapter 3: Derivative 3.1. Definition of derivative, tangent line and slope 3.2. One-side derivatives 3.3. Derivative on an interval. 3.4. The relationship between differentiation and continuity 3.5. Differentiation rules 3.6. Derivative of composite function and inverse function	12		- Preview: + Books [1]: sections 2.1 and 2.2. + Search: Derivative in books [5] - [11]. - Solve exercises 1 - of chapter 2 in book [1].
7	3.7. Derivative of implicit function. 3.8. Derivative of basic elementary function. 3.9. Higher derivatives. 3.10. Differential. 3.11. Mean value theorems	12		- Preview: + Books [1]: sections 2.2, 2.3, and 2.4. + Search: Derivative in books [5] - [10]. + Review: sections 3.1 - 3.6 of lecture note. - Solve exercises 5 -20 of chapter 2 in book [1].
8	3.12 L' Hospital Rule 3.13 Taylor formula 3.14. Extrema 3.15. Absolute minima and absolute minima 3.16. Rates of change	12		- Preview: + Books [1]: sections 2.5 and 2.6. + Search: L' Hospital rule and absolute minima and absolute maxima in books [5] - [8]. + Review: section 3.7 - 3.10 of lecture not and book [7]. - Solve exercises 21 - 41 of chapter 2 in book [1].
9	Chapter 4: Integral 4.1. Indefinite integrals	12		- Preview: + Books [1]: section 3.1. + Search: Antiderivative and indefinite integrals in books [5] - [8].

				- Solve exercises 1 - 8 of chapter 3 in [1].
10	4.2. Definite integrals	12		- Preview: + Books [1]: section 3.2. + Search: Definite integrals in books [5] - [8]. + Review: section 4.1 of lecture note. - Solve exercises 9 - 16 and 19 - 26 of chapter 3 in book [1].
11	4.2. Definite integrals 4.3. Improper integrals	12		- Preview: + Books [1]: section 3.3 + Search: Improper integrals in books [5] - [11]. + Review: section 4.2 of lecture note. - Solve exercises 17, 18 of chapter 3 in book [1].
12	Chapter 5: Ordinary differential equations 5.1. Concept of ordinary differential equations 5.2. Separable equations 5.3. Homogeneous equations 5.4. First-order linear equations	12		- Preview: + Books [2]: section 5.2. + Search: First order ordinary differential equations in books [5] -[9]. - Solve exercises 1 - 4 of chapter 5 in book [2].
13	5.5. Bernoulli equations 5.6. Exact equations 5.7. Second-order linear equations with constant coefficients	12		- Preview: + Books [2]: sections 5.2 and 5.3. + Search: Second-order differential equations in books [5] - [8] and [11]. + Review: sections 5.1 - 5.4 in lecture note. - Solve exercises 5 - 7 and 12, 13 of chapter 5 in book [2].
14	Chapter 6: Function of several variables 6.1 Concept of function of several variables 6.2. Limit, continuity 6.3. Partial derivative and higher partial derivatives	12		- Preview: + Books [2]: sections 1.1, 1.2 and 1.3 . + Search: Function of several variables in books [5] - [8], [11]. - Solve exercises 1- 6 of chapter 1 in book [2].
15	6.4. Differential 6.5. Extrema of function of several variables 6.6. Absolute minima and absolute maxima	12		- Preview: + Books [2]: sections 1.4, 1.12 and 1.13 in book [2]. + Search: Differential, extrema and absolute minima and maxima in books [5] - [8]. + Review: sections 6.1- 6.3 in lecture note. - Solve exercises 21 - 27 of chapter 1 in book [2].

Can Tho, 12/2/ 2014

**ON BEHALF OF RECTOR
DEAN/ DIRECTOR**

HEAD OF DEPARTMENT