YOGYAKARTA STATE UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES

SYLLABI

FRM/FMIPA/063-00
1 April 2010

Faculty : Mathematics and Natural Sciences
Study Program : Mathematics Education
Course / Code : Complex Analysis / MAT 316
Credits : Theory: 2 SKS Practice: 1 SKS
Semester : 6th
Prerequisite/Code : Advanced Calculus / MAT 313
Professor : Eminugroho Ratna Sari, M.Sc.

I. Course Description :

Complex Analysis covers the topics of complex number system, complex plane, functions and limit, continuity of functions, differentiation, elementary functions of a complex variable: exponential functions, logarithm functions, trigonometry functions, hyperbolic functions; contour integration, the maxima modulus theorem, Cauchy's theorem, Cauchy's formula.

II. Standard Competence:

Students are expected to be able to: (1) explain the complex number system and complex plane coordinate, (2) determine the functions, limit, and continuity of functions, (3) explain the differentiation, elementary functions of a complex variable: exponential functions, logarithm functions, trigonometry functions, hyperbolic functions, (4) determine the contour integration, (5) apply the maxima modulus theorem, (6) determine the Cauchy's theorem, (7) determine Cauchy's formula.

III. Activity:

Meeting	Basic Competence	Essentials Concept	Learning Strategy	References
1-2	Explaining complex number system and algebraic properties,	i) complex number system ii) algebraic properties	Group discussion and presentation.	A: 1-5 B: 1-5
3 – 4	Explaining modulli and conjugate	i) modulli ii) conjugate	Group discussion,exercise	[A]:6-11 [B]:1-5
5 – 7	Explaining complex plane coordinate,	i)Complex plane coordinate	Group discussion and presentation.	A: 12-14

	polar form, powers and roots of complex number	ii) polar form iii) powers and roots of complex number		B : 5-18
8	Explaining regions in the complex plane	regions in the complex plane	Group discussion and presentation.	A: 23-27 D:7-9
9 – 11	Explaining functions of complex variables, limits, theorems on limits, and continuity	i)Functions of complex variables ii)Limits iii)Continuity	Group discussion and presentation.	A: 26-43 B: 42-45 C:17-20 D:44-45
12 – 15	Explaining derivatives of complex functions, differentiation formulas, Cauchy-Riemann equations and sufficient conditions for differentiability	i)derivatives of complex functions ii)differentiation formulas iii)Cauchy-Riemann equations iv)sufficient conditions for differentiability	Group discussion and presentation.	A: 43-52 B: 59-71 C:31-32
16	**Exam 1**			
17 – 18	Explaining analytic functions, harmonic functions and determine a harmonic conjugate	i)Analytic functions ii)Harmonic functions iii)Harmonic conjugate	Questioning-answers, Classical discussion, presentation	[A]: 55-62 [B]: 42-45, 54-57
19 – 24	Explaining elementary functions	i)The exponential functions ii)Trigonometric functions iii)hyperbolic functions iv)The logarithmic functions v)complex exponent vi)inverse trigonometric functions	Questioning-answers, Classical discussion, presentation	[A]: 65-84 [B]: 19-20 [D]:39-41
25 – 26	Determining definite integral and explaining countours integrals of complex functions	i)Definite integral ii)Contours integrals	Questioning-answers, Classical discussion, presentation	[A]:86-97 [B]: 70-75
27 – 28	Determining antiderivatives complex functions and determining integral by Cauchy Goursat Theorem	i) Antiderivatives ii)The Cauchy-Goursat Theorem	Questioning-answers, Classical discussion, presentation	[A]:104-111 [B]:110-112 [D]:106-107

29 – 30	Determining integral by Cauchy's formula and Explaining Morera theorem	i)The Cauchy integral formula ii)Morera Theorem	Questioning-answers, Classical discussion, presentation	[A]:127-128 [B]:119-122
31	Explaining Liouville theorem	Liouville theorem	Questioning-answers, Classical discussion, presentation	[A]:130-132 [B]:117-118
32	**Exam 2**			

IV. References:

[A] Churchill, R.V.1990. *Complex Variable and Application, Fifth Edition.* New York: McGrawHill Publishing Company.

[B] Saff,E.B. and A.D.Snider**.** 2001**.** *Fundamentals of Complex Analysis with Applications to Engineering and Sciences Third Edition.* Prentice Hall Upper Saddle River

[C] Lang, S. 1999. *Complex Analysis Fourth Edition*. USA: Springer-Verlag,Inc

[D] Murray R. Spiegel. 1988. *Complex Variables*. Schaum's Outline series. Mc Graw-Hill Company.

V. Evaluation :

No	Componen	Worth
1	Participation	15 %
2	Assignment	30 %
3	Exam 1 & 2	25%
4	Final Exam	30%
Total		100%

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