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.

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.
<table>
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<th>Group</th>
<th>Activity Description</th>
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<th>Schedule</th>
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|       | Explaining polar form, powers and roots of complex number                            | i) polar form  
ii) powers and roots of complex number                      |          |
|       | ii) polar form  
ii) powers and roots of complex number                      | i) Functions of complex variables  
ii) Limits  
iii) Continuity | B: 5-18  
D: 7-9 |
| 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 | A: 26-43  
B: 42-45  
C: 17-20  
D: 44-45 |
|       | Group discussion and presentation.                                                    |                                                        |          |
| 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 | A: 43-52  
B: 59-71  
C: 31-32 |
|       | Group discussion and presentation.                                                    |                                                        |          |
| 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 |
|       | Questioning-answers, Classical discussion, presentation                               |                                                        |          |
| 19 – 24| Explaining elementary functions                                                       | i) The exponential functions  
ii) Trigonometric functions  
iii) Hyperbolic functions  
iv) The logarithmic functions  
v) Complex exponent  
vii) Inverse trigonometric functions | Questioning-answers, Classical discussion, presentation  
[A]: 65-84  
[B]: 19-20  
[D]: 39-41 |
|       | Questioning-answers, Classical discussion, presentation                               |                                                        |          |
| 25 – 26| Determining definite integral and explaining contours integrals of complex functions  | i) Definite integral  
ii) Contours integrals                        | Questioning-answers, Classical discussion, presentation  
[A]: 86-97  
[B]: 70-75 |
|       | Questioning-answers, Classical discussion, presentation                               |                                                        |          |
| 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
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:


V. Evaluation

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<td>Assignment</td>
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Yogyakarta, Agustus 2011

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