

**Course: ZAB0261 - Calculus II**

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| Credits per class: | 4          |
| Credits per paper: | 0          |
| Total hours:       | 60 h       |
| Type:              | Semester   |
| Activation:        | 01/01/2006 |

**Goals**

Making the student acquainted with the theoretical bases and the main concepts of multivariable differential and integral calculus. Practicing the fundamental methods of derivation and integration. Application of differential equations to classic physical problems and engineering problems. Methods for the solution of differential equations applied to engineering problems.

**Program Summary**

Vector functions, partial derivatives, directional derivatives, gradients, fields, inverse function theorem, ordinary differential equations.

**Program**

Multivariable functions: limits and continuity  
Contour curves. Contour surfaces. Applications in engineering problems. Relief description and temperature distribution in flat surfaces and ovens. Partial differentials and derivatives. Chain rule.  
Directional derivative and gradient  
Vector functions, limit, derivative and integral. Spatial motion, Kepler's Laws.  
Tangent planes, normal lines related to surfaces  
Vector fields and flux. Divergences and curls.  
Inverse function theorem. Implicit function theorem  
Multivariable function extremes. Lagrange's multipliers.  
1<sup>st</sup> and 2<sup>nd</sup> order ordinary differential equations: Integration methods.  
Introduction to differential equation systems. Application on wave equations in material means and in vacuum (thermal and luminous radiation). Applications on heat conduction equations.

**Evaluation**

**Method**

Theoretical classes and exercises

**Criteria**

3 tests during the semester  
Average test grade = M1  
If  $M1 \geq 5$  = pass.

**Norms for make-up exams**

Two tests to be applied, according to the professor's discretion.  
Grades for these tests are PR1 and PR2  
To pass, the student has to have a final average grade  $MF \geq 5$   
 $MF = (PR1 + PR2 + M1)/3$

## References

STEWART J. Calculo II – 4a EdiçãoEd. Pioneira , Thomson Learning.

ÁVILA, G.S.S. Cálculo I - Funções de uma variável. 4ª edição, Livros Técnicos e Científicos Editora S.A., 1983.

BOULOS, P. Cálculo Diferencial e Integral, vol. 1, Makron Books do Brasil Editora Ltda, 1999.

FLEMING, D.; GONÇALVES, M.B. Cálculo A - Funções, limite, derivação, integração. 5ª ed., Makron Books do Brasil Editora Ltda., 1992.

GUIDORIZZI, L.H. Um curso de Cálculo - vol. 1, Livros Técnicos e Científicos Editora S.A., 1985.

LEITHOLD, L. O cálculo com geometria analítica - vol. 1, 2ª edição, Harper & Row do Brasil Ltda., 1982.

MORETTIN, P A.; BUSSAB, W. O. Calculo : funções de uma variável, 3ª ed. Atual Editora, 1987.

MUNEM, M.A.; FOULS, D.J. Cálculo, 2ª ed., Guanabara Dois, 1986.

SWOKOWSKI, E.W. Cálculo com Geometria Analítica, vol. 1, McGraw-Hill do Brasil, 1983.

SIMMONS, GF. Cálculo com Geometria Analítica, vol. 1, McGraw-Hill do Brasil, 1987.