

Mathematical Course in a Master of Theoretical Physics in Annaba-University
(For 2013--2014)

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Aim: The aim of this course is to provide the students of Master in Theoretical Physics with required background in Mathematics which help them to understand and master the mathematical tools used in Theoretical Physics.

It is scheduled: I teach two course and a TD per week

First Semester:

1. Analyse complexe .
2. Séries infinies .
3. Equations différentielles .
4. Equations intégrales .
5. Théorie de Sturm-Liouville, fonctions orthogonales .
6. Séries de Fourier .
7. Fonctions spéciales .
8. Transformations intégrales .
9. Calcul variationnel .
10. Théorie de groupe .
11. Introduction à la théorie de matrice aléatoire.

References:

1. G. Arfken, Mathematical methods for physicists,
2. J. F. Cornwell, Group theory in physics I and II
3. M.L. Mehta, Random matrices and the statistical theory of energy levels.

Second Semester:

1. Variétés et formes différentielles .
2. Variétés de Riemann .
3. Notions de topologie .
4. Connections .
5. Classes caractéristiques et théorie K .
6. Théorème index .
7. Applications : théories de Yang-Mill et théorie d'Einstein de la gravitation.

References:

1. M.Nakahara, Geometry, Topology and Physics;
2. C.Nash, S.Sen, Topology and Geometry for physicists;
3. C.J.Isham, Modern Differential Geometry for Physicists;
4. T.Eguchi, P.B.Gilkey, A.J.Hanson, Gravitation, Gauge Theories and Differential Geometry.