مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

مختصر توصيف المقرر

معلومات المقرر * **(Course Information)**

اسم المقرر:	الفيزياء الإحصائية
رقم المقرر:	فيز 3422
اسم ورقم المتطلب السابق:	فيز 2412
اسم ورقم المتطلب المرافق:	--
مستوى المقرر:	الخامس
الساعات المعتمدة:	3 (3+0+0)

Module Title:	Statistical Physics
Module ID:	PHYS 3422
Prerequisite:	PHYS 2412
Co-requisite:	--
Course Level:	Fifth
Credit Hours:	3 (3+0+0)

وصف المقرر : **Module Description**

Theoretical part: Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemble, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate Bose gas.

أهداف المقرر : **Module Aims**

1	Probability and density functions	1
2	Kinetic Theory of gases	2
3	Maxwell-Boltzmann statistics	3
4	Classical statistics (Canonical, Microcanocical and Grand Canonical Ensembles)	4
5	Quantum statistics (Fermi-Dirac and Bose-Einstein statistics)	5

Learning Outcomes: **مخرجات التعليم:**

1	Apply kinetic theory of gases and ideal gas law in various situations.	1
2	Compare the statistical distributions (Maxwell-Boltzmann, Fermi-Dirac, Bose-Einstein1 and apply them appropriately.	2
3	Derive entropy from a microscopic behavior of a system.	3
4	Relate thermodynamical properties to atomic states.	4
5	Differentiate between the statistical ensembles.	5
6	Apply the statistical nature of atomic distribution to calculate specific heat.	6

Course Contents: **محتوى المقرر:**

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)
9	**3**	Probability and distribution functions
12	4	Kinetic Theory of Gases, Maxwell-Boltzmann Statistics
6	2	Classical Statistics, Canonical Ensemble, Two level Systems
6	2	Micro-Canonical ensemble, Grand Canonical Ensemble
6	2	Quantum Statistics, Vibration of a solid
3	1	Bose-Einstein Statistics, Fermi-Dirac Statistics

Textbook and References: **الكتاب المقرر والمراجع المساندة:**

سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم الكتاب المقرر Textbook title
2007	Cambridge University Press	Mehran Kardar	Statistical Physics of Particles
سنة النشر Publishing Year	**اسم الناشر Publisher**	**اسم المؤلف (رئيسي) Author's Name**	**اسم المرجع Reference**
2007	Cambridge University Press	Keith Stowe	An Introduction to Thermodynamics and Statistical Mechanics
0471915335	Wiley	F. Mandl	Statistical Physics