

مواصفات مقرر رنين مغناطيسي

- البرنامج الذي يقدم المقرر من خلاله (إعداد معلم الفيزياء)
- يمثل المقرر عنصرا (رئيسيا) بالنسبة للبرنامج
- القسم العلمي المسئول عن البرنامج (متعدد)
- القسم العلمي المسئول عن تدريس المقرر (قسم الفيزياء)
- السنة الدراسية / المستوى (الفرقة الرابعة عام. شعبة الفيزياء / الفصل الدراسي الثاني)
- تاريخ اعتماد توصيف البرنامج ()

Basic Data

بيانات أساسية

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|----------------------|-------------------------------|-----|
| (1) Course Title: | العنوان : رنين مغناطيسي | (1) |
| (2) Course Code No.: | الكود : 425 Ph | (2) |
| (3) Credit Hours: | Three credit hours | (3) |
| Lectures: | المحاضرات : 2 credit hours | • |
| Laboratory practice: | الدروس العملية : 1credit hour | • |
| Total hours: | المجموع : 3 credit hours | • |

بيانات مهنية

1) General goals of the course

(1) الأهداف العامة للمقرر

The course is designed to help student-teachers achieve the following goals:

- Developing the basic technical applications of electron spin and magnetic moments (EMR) and nuclear spin and magnetic moment (NMR), some applications of magnetic resonance (MRI) in Biology, and Medicin
- Developing the student skills in the field of nuclear magnetic resonance that provide a good orientation of students needed to meet high technology challenges

2) Operational learning objectives of the course

(2) الأهداف الإجرائية للمقرر

A) Knowledge and Comprehension:

(أ) المعرفة والفهم

The student have to recognize the following:

- a.1 Electron paramagnetic resonance spectra.
- a.2 Nuclear magnetic resonance spectrum
- a.3 Magnetic noise and Bloch formulations.

B) Cognitive Skills:

(ب) المهارات العقلية:

- b.1 Zeeman hyperfine spin-spin interaction and nuclear Zeeman Effect.
- b.2 Hamiltonian and wave function.
- b.3 The complete Hamiltonian operator.

C) Practical Skills:

(ج) المهارات العملية:

- c.1 Electron spin echo.
- c.2 The NMR spectrum.
- c.3 Structure of metals: close packed arrangement and types of alloys.

D) Enabling Skills:

(د) المهارات العامة والمنقولة:

- d.1 The students have to recognize the role of external and internal hazards of radiation sources and radiation protection..
- d.2 Create and maintain an educational environment in which conceptual understanding will occur for all science students.

Contents**المحتويات**

Week	Topic	Assigned hours			
		Lectures	Laboratory	Total	
First	▪ The resonance phenomenon. ▪ Electron spin and magnetic moment. ▪ Energy of free electron in a magnetic field. ▪ Electron paramagnetic resonance spectra.	2	2	4	
Second		2	2	4	
Third		▪ wave function. ▪ The complete Hamiltonian and Hermitian operator	2	2	4
Fourth			2	2	4
Fifth	▪ The Zeeman hyperfine. ▪ Spin- spin interaction, crystal field.	2	2	4	
Sixth		2	2	4	
Seventh	▪ Spin- orbit coupling. ▪ Nuclear Zeeman effects.	2	2	4	
Eighth		2	2	4	
Ninth	▪ Theory of relaxation and line shapes. ▪ Electron spin echo. ▪ The NMR spectrum.	2	2	4	
Tenth		2	2	4	
Eleventh	▪ Origin of the spectrum ▪ The chemical shift. ▪ Physical mechanism underlying chemical shifts line multiplicity in NMR. ▪ Analysis of spin systems. ▪ The linewidths of NMR spectra. ▪ Magnetic noise. ▪ The Bloch formulations	2	2	4	
Twelfth		2	2	4	
Thirteenth		2	2	4	

Activities, tasks and assignments:**أساليب التعليم والتعلم:**

- Lectures
- Laboratory experiments.
- Demonstrations

- report writing
- brainstorming
- discussions
- Problems and essay assignments.

Assessment and Evaluation tools:

أساليب التقييم

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- Semester activities including classroom interactions and Quizzes.
- Lab performance evaluation
- Oral exam.
- Final exam.

Summative Evaluation table

جدول التقييم

Assessment	Final exam	Fifteenth Week	الأسبوع الخامس عشر	نهاية الفصل الدراسي	التقييم
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النسبة المئوية لكل تقييم

Assessment		التقييم
1. Midterm exam	--	1. امتحان نصف الفصل الدراسي
2. Final written exam	%80	2. امتحان نهاية الفصل الدراسي
3. Final oral exam	--	3. الامتحان العملي
4. assignments	%20	4. أعمال السنة
Total	%100	المجموع

قائمة المراجع

- "Electron spin resonance theory and applications" by N.M.A theraton John Wiley and Sons Inc, New York (1973)".
- "Electron spin resonance elementary theory and practical applications" by John E.Wentz and James R.Botton McGraw- Hill Book company, New York Elementary Solid State Physics. By M.Ali Omar Revised Printing Addison Wesley Longman 1993.

الإمكانات المطلوبة للتعليم والتعلم

- References
- Chemistry library
- Textbooks
- Computer simulation programs and slides.
- Transparencies.
- Manual of solved problems (answer and solutions)
- Handouts and problem sets.
- Electronic, web, and multimedia based resources.
- Lab work.

• منسق المقرر:

• رئيس القسم:

• التاريخ: