Department of Mathematics

College of Education

University of Salahaddin

Subject: (Optional) Polynomial Rings

(First course)

Course Book – (Year 4)

Lecturer's name Dr. Neshtiman N. Sulaiman

Academic Year: 2022/2023

Course Book

1. Course name	Polynomial Rings
2. Lecturer in charge	Neshtiman N. Sulaiman
3. Department/ College	Mathematics / Education
4. Contact	e-mail: neshtiman.suliman@su.edu.krd Tel: (optional)
5. Time (in hours) per week	Theory: 3 Practical:
6. Office hours	Sunday(8:30-10:30), Thursday (8:30-9:30) or by appointment.
7. Course code	
8. Teacher's academic profile	BSc. 1988 at University of Salahaddin / College of Education / Erbil / Iraq MSc. 1994 at University of Al-Mustansria /College of Education/Baghdad/Iraq PhD. 2013 at University of Salahaddin / College of Education / Erbil / Iraq **Specific specialization:** Algebra(Derivation prime Γ-rings) **Subject under teaching:** During my work in University of Salahaddin , I have taught the following courses at all the four undergraduate levels . 1- Calculus. 2- Advanced Calculus 3- Abstract algebra (Group Theory and Ring Theory) 4- Linear Algebra 5- Extension field. 6- Finite Mathematics. 7- Module Theory. 8- Programming(Pascal+Matlab+Fourtran+Quic basic,..) 9- Fundamental logic
9. Keywords: Group, Homomorphism	

10. Course overview:

The main topic of the course is to introduce students to Polynomial rings, including the Fundamental theorem as Factorization Theorem, Fundamental theorem of algebra and Eisenstein Criterion.

11. Course objective

1- Students should be able to demonstrate an understanding of the basic definitions and theorems of polynomial rings.

2- Students should be able to complete problems and proofs which demonstrate both an understanding of the mechanics of the topic as well as an understanding of the basic

underlying theories.

3- Students should be able to follow and to construct a formal mathematical proof using each of the following methods: a direct proof, a proof by contradiction and a proof by induction.

4- Students should be able to communicate mathematical ideas both in written and oral form for a variety of audiences.

5- Students should be able to identify some of the key historical figures in the field of abstract algebra.

6- Students should be able to demonstrate an understanding of the relationship of abstract algebra to other branches of mathematics and to related fields.

7. Students should be able to independently explore related topics using resources other than the text.

12. Student's obligation

1- Attendance.
2- Quiz.
3- tests about some questions after each month.
4- Two examinations will be given, if we have a time, each 30%.
5- Final exam 60%.

13. Forms of teaching

1- data show
2- whiteboard
3- Power point

14. Assessment scheme

1- Attendance.
2- Quiz. 3%
3- Participation and discussion in the class 3%
4- Assignments (H.W) 2%
5- Tests about some questions after each month. 2%
6- Midterm tests 2(each 15%) 30% (December , March)
7- Final Examination 60%

15. Student learning outcome:

- Student recall and be able to use the axioms that define a ring, and know the basic properties of rings arising from these axioms
- Student know how to add and multiply polynomials over arbitrary fields, and be able to use this t o define polynomial rings
- Student understand the statement and proof of the Division Algorithm for polynomials, and be able to apply polynomial long division in the ring Q[x]

- understand the meaning of the highest common factor of two polynomials, the proof of existence of the hcf, the meaning of 'coprime' in the context of
- polynomials over fields, and be able to apply the Euclidean Algorithm to compute the hcf of two polynomials *f* and *g* in Q[x], and find polynomials *a*, *b* such that hcf(*f*, *g*) = *af* + *bg*
- students understand the meaning of the least common multiple of two polynomials, the proof of its uniqueness, and be able to compute lcms in the polynomial ring Q[x].

16. Course Reading List and References:

1-J. B. Fraleigh "*A First Course in Abstract Algebra*". Addison Wesley publishers. Reading, Mass. (1982)
2- I. N. Herstien, "*Topics in Algebra"*, John Wieley and Sons, New-York, (1975).
3- D. Burten, " *An Introduction to Modern Abstract Algebra*". Addison Wesley.
4- S. Singh & Q. Zameeraddin, "*Modern Algebra*". Vikas publishing house, (2000)
5- Dummit & Foote. "*Abstract Algebra*", (2007)
6- J.petere , cameon," *Introduction to Modern Algebra"* (2008).
7- د.بروين علي حمادي " الجبر المجرد الزمر والحلقات " منشورات جامعة عمر المختار البيضاء.

17. The Topics:	Lecturer's name
First Course: Polynomial Rings **1 Week 4/9**: Basics + Definitions and Examples of rings . **2 Week 11/9-18/9:** some theorems about ring theory. **3 &4 Week 18/9- 2/10:** Basics + Definitions and Examples Polynomial rings **5, 6,7, 8 Week 2/10-31/10:** free. **9 Week 6/11:** Division algorithm. **10 &11 Week 13/11-22/11:** Fundamental theorem of algebra **12, 13 Week 4/12:** Eisenstein Criterion Theorem. **14 Week 11/12:** Midterm exam	Neshtiman N. Sulaiman
18. Practical Topics (If there is any)	

19. Examinations:

There will be one two-hour examinations given during the semester (each announced at least one week of prior notice) and a final examination.

• Homework I will collect homework every two week .

- Quiz every week.

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20. Extra notes:

21. Peer review **پێداچوونەوەی هاوەڵ**