

CURRICULUM VITA

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Professor

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PERSONAL DATA

- Year of Birth: 1971.
- Nationality: Jordanian.
- Marital Status: Married with two children.
- Living Address: King Abdullah Street 512, Irbid 21433, JORDAN.
Street 12, House 22, Sultan Qaboos Univ. OMAN.

ACADEMIC HISTORY

1. **Ph.D.** in Mathematics: Commutative Algebra.
New Mexico State University, Las Cruces, NM, USA, August 2004. Thesis title "*The Ratliff-Rush Closure and a Minimal Groebner Basis for Certain Affine Monomial Curves*".
2. **M.Sc.** in Mathematics.
Al al-Bayet University, Mafraq, Jordan, Oct. 1997. Thesis title "*On the Learning Algorithms of Artificial Neural Networks and the Singular Value Decomposition of Matrices*".
3. **B.Sc.** in Mathematics **Mu'tah University, Karak, Jordan**, August 1994.

EXPERINECE

1. **2019 – Present:** Department of Mathematics, **Sultan Qaboos University**, Oman
(On sabbatical and unpaid leave from **JUST**)
2. **2020 – Present: Professor.**
Department of Mathematics and Statistics, **Jordan University of Science and Technology**.
3. **2011 – 2020: Associate Professor.**
Department of Mathematics and Statistics, **Jordan University of Science and Technology**.
4. **2004 – 2011: Assistant Professor.**
Department of Mathematics and Statistics, **Jordan University of Science and Technology**.
5. **2001 – 2004: Instructor.**
Department of Mathematical Sciences, **New Mexico State University**, USA.
6. **1999 – 2001: Teaching Assistant.**
Department of Mathematical Sciences, **New Mexico State University**, USA.

TEACHING (T)

In current circumstances caused by the Covid-19, moving to online teaching is an essence. I prepared myself for such situations. Using the OBS studio, the Microsoft whiteboard, and a writing tablet, I managed to create synchronized lectures that are environment like real class lectures. My lectures are now recorded and published in my Youtube channel:

<https://www.youtube.com/channel/UCrkjF6TQKJ5tFxNj4552LpA/videos>

• (T1) Courses Taught

1. Sultan Qaboos University (SQU), Oman (2019 -- Present)

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|----------------------|--------------------------|---------------------------------|
| 1. Calculus I. | 2. Business Mathematics. | 3. Discrete Math. Comp. Science |
| 4. Abstract Algebra. | 5. Linear Programming | 6. Linear Algebra for Engineers |

2. Jordan University of Science and Technology (JUST) (2004 -- 2019)

(i) General Courses:

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|------------------------------------|-------------------------------|
| 1. Calculus I, II. And III. | 2. Discrete Mathematics. |
| 3. Calculus for Biological Science | 4. Elementary Linear Algebra. |

(ii) Math. Major Courses:

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|--------------------------|---|
| 7. Linear Algebra. | 8. Logic and Set Theory. |
| 9. Number Theory. | 10. Applied Abstract Algebra: <i>Coding and Cryptography.</i> |
| 11. Abstract Algebra I. | 12. Seminar and report: <i>supervised students to write reports on a various topics in mathematics.</i> |
| 13. Abstract Algebra II. | |

(iii) Graduate Level Courses

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|---|---|
| 14. Abstract Algebra I: <i>Ring and Module Theory</i> | 15. Seminar: <i>Mathematical writing, Scientific Workplace.</i> |
| 16. Abstract Algebra II: <i>Field and Galois Theory</i> | |
| 17. Independent Studies: <i>Comp. Comm. Algebra.</i> | |

3. New Mexico State University, USA (2000 -- 2004)

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| 1. Calculus for Business and Biological Sciences | 2. Trigonometry. |
| 3. Intermediate Algebra. | 4. College Algebra. |
| | 5. Calculus I and II. |

• (T2) Graduation Projects; Supervisor

1. Sultan Qaboos University

1. Block Design; an application of finite field extensions, Fall 2020.
2. BCH Codes, Spring 2022

2. Jordan University of Science and Technology (some recent projects)

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|---------------------------------|--------------------------------------|
| 1. The Golden Ratio; Fall 2018. | 2. Fermat's Last Theorem, Fall 2108. |
| 3. Greobner Bases; Fall 2017. | 4. RSA cryptography, Spring 2016. |

• (T3) Curriculum Development

1. I played a major role in accommodating the series of the three Calculus courses at JUST according to student's needs.
2. I played *the major* role in changing the syllabi of the two graduate courses of *Algebra* at JUST so that the first course covers the theory of *Rings and Modules*, and the second course covers *Field and Galois Theory*.
3. I developed a new course; Special Topics in Algebra (*Coding and Cryptography*).

• (T4) Course Coordinator

I have coordinated the following general courses: Calculus I, II and III, Discrete Mathematics, and Calculus for Biological Science. The coordination duties include:

1. **Preparing detailed syllabus that includes:**
 - The topics of the course with a weekly time schedule.
 - Course objectives that must be also entered into the online system of "*Quality Assurance*" (for the ABET) and then connected and weighted with the *Program Learning Outcomes*.
 - Suggested exercises, textbooks, references, and instructions to students and teachers.
2. **Writing exams and supervising the grading process:** This includes connecting and weighting every question in the exam with its course objective and enter this in the online system of "*Quality Assurance*" (for the ABET).
3. **Regular meetings with instructors:** Follow up the teaching process and collecting feedbacks.
4. **Analyzing and reporting:** analyzing the results and writing a detailed report to the department chairperson at the end of every semester.
5. **Contributes to the development:** planning and implementation of high quality curriculum through a continuous collecting of feedback from students and instructors.

• (T5) Supervising Master Theses

I supervised (as a major advisor) the following master theses at JUST

1. Generalizing Some Results on the Ratliff-Rush Reduction Number, December 2018.
2. The Ratliff-Rush Reduction Number of some Homogenous Ideals, December 2017.
3. The Reduction Number of Certain Monomial ideals, December 2016.
4. Normality of Certain Monomial Ideals, October 2014.
5. Chains of Ideals and the Ratliff Rush Closure, October 2014.
6. Groebner Bases for Certain Monomial Curves, January 2013.
7. Infinite Families of Rattliff-Rush Ideals, January 2010.
8. Generalizing Some Results on the Normality of Ideals, January 2010.

• (T6) Examiner for Master Theses

I was an examiner for the following master theses at JUST

1. Covering Linear Spaces by Finitely Many Subspaces, August 2015.
2. On Almost Semiprime Ideals of Commutative Rings, August 2015.
3. On Properties of Graded Classical Prime Submodules, August 2014.
4. Properties of Graded Weakly Prime Submodules, August 2014.
5. On Finite F-Groups. December 2011.
6. Generalization of Primal Ideals over Commutative Semirings, December 2010.
7. Generalization of Primary Ideals and Submodules, August 2010.
8. Almost Graded Prime Submodules, August 2010.

RESEARCH (R)

• (R1) Research Interest

Commutative Algebra: The Ratliff-Rush and the integral closure (normality) of ideals. Cover ideals of graphs. Superficial ideals. The reduction number of monomial ideals. Gröbner bases of ideals. Number of generators of powers of ideals.

• (R2) Papers in Progress

1. **I. Al-Ayyoub** and O. Tout, [An Algorithm for Computing the Ratliff- Rush Operation of Monomial Ideals in Polynomial Rings with Multivariables](#).
2. **I. Al-Ayyoub**, [A Generalized Algorithm for the Ratliff-Rush Closure](#).

• (R3) Submitted Papers

1. **I. Al-Ayyoub**, M. Nasernejad, and L. Roberts, [On the Strong Persistence Property and Normality of Cover Ideals of Theta Graphs](#), Submitted to *Communications in Algebra*.

• (R4) Accepted and Published Papers

1. **I. Al-Ayyoub**, M. Nasernejad, L. Roberts, On the Normality and the Associated Primes of Cover Ideals of a Class of Imperfect Graphs, *to appear in Mathematical Reports*.
2. **I. Al-Ayyoub**, M. Nasernejad, L. Roberts, K. Khashyarmansh, and V.C. Quiñonez, [Some Results on the Normality of Square-free Monomial ideals and Cover Ideals of Graphs](#), *Mathematica Scandinavica*, 127 (2021); 441-457.
3. **I. Al-Ayyoub**, [Results on the Behavior of the Ratliff-Rush Operation and the Depth of the Associated Graded Ring](#), *Communications in Algebra*, 49 (8) (2021); 3447-3456.
4. **I. Al-Ayyoub** and M. Nasernejad, [Monomial Ideals with Tiny Squares and Freiman Ideals](#), *Czechoslovak Mathematical Journal*, 71 (146) (2021); 847-864.
5. **I. Al-Ayyoub** and M. Nasernejad, [Freiman Ideals and the Number of Generators of Powers of Monomial Ideals](#), *Communications in Algebra*, 49 (2) (2021); 877-891.
6. **I. Al-Ayyoub**, [On the Reduction Numbers of Monomial Ideals](#), *Journal of Algebra and its Applications*, 19 (10) (2020) 2050201 (27 pages).
7. **I. Al-Ayyoub**, M. Jaradat, and K. Al-Zoubi, [A Note on the Ascending Chain Condition of Ideals](#), *Journal of Algebra and its Applications*, 19 (7) (2020) 2050135 (19 pages).
8. **I. Al-Ayyoub**, M. Nasernejad, and L. Roberts, [Normality of Monomial Ideals under some Operations with Application to Cover Ideals](#), *Results in Mathematics*, 74 (4) (2019)
9. M. Nasernejad, K. Khashyarmansh, and **I. Al-Ayyoub**, [Associated Primes of Powers of Cover Ideals under Graph Operations](#), *Communications in Algebra*, 47 (5) (2019); 1985-1996.
10. **I. Al-Ayyoub**, I. Jaradat, and K. Al-Zoubi, [On the Normality of a Class of Monomial Ideals via the Newton Polyhedron](#), *Mediterranean Journal of Math.* 16 (3) (2019); 1-16.
11. S. Rajaei, M. Nasernejad, and **I. Al-Ayyoub**, [Superficial Ideals for Monomial Ideals](#), *Journal of Algebra and its Applications*, 17 (6) (2018) 1850101 (30 pages).
12. K. Al-Zoubi, **I. Al-Ayyoub** and M. Al-Dolat, [On graded 2-absorbing compactly packed modules](#), *Advanced Studies in Contemporary Math.* 28 (3) (2018); 479-486.
13. K. Al-Zoubi, R. Abu-Dawwas, and **I. Al-Ayyoub**, [Graded Semi-prime Submodules and Graded Semi-radical in Graded Modules](#), *Ricerche di Matematica*, 66 (2) (2017); 449 – 455.

14. **I. Al-Ayyoub** and O. Sulaiman, [Infinite Families of Ratliff-Rush Ideals](#), **International Journal of Algebra**, 6 (17) (2012); 815-824.
15. **I. Al-Ayyoub**, [The Ratliff-Rush Closure of Initial Ideals of Certain Prime Ideals](#), **Rocky Mountain Journal of Mathematics**, 40 (4) (2010); 1085-1093.
16. **I. Al-Ayyoub**, [Results on the Ratliff-Rush Closure and the Integral Closeness of Powers of Certain Monomial Curves](#), **Communications in Algebra**, 38 (12) (2010); 4553 – 4568.
17. **I. Al-Ayyoub**, [Normality of Monomial Ideals](#), **Rocky Mountain Journal of Mathematics**, 39 (1) (2009); 1-9.
18. **I. Al-Ayyoub**, [An Algorithm for Computing the Ratliff-Rush Closure](#), **Journal of Algebra and its Applications**, 8 (4) (2009); 521-532.
19. **I. Al-Ayyoub**, [Reduced Gröbner Bases of Certain Toric Varieties; a New Short Proof](#), **Communications in Algebra**, 37 (9) (2009); 2945-2955.

COMMUNITY WORK (CW)

I manage to contribute to departmental or University-wide working groups or committees as requested. Also, I support and participate in student organizational activities.

• (CW1) Committees

(i) At the department of mathematics (SQU):

1. Final Year Project Committee (Coordinator).
2. Examination Committee.
3. Research Committee.

(ii) At the College of Science and Arts (JUST):

1. **ABET Committee:** responsible for tracking the required materials for ABET files of every course at the Dept. of Math.
2. **Students Legal Issues Committee:** conducting investigations on the cases of allegations of misconduct or nonacademic behavior.

(iii) At the department of mathematics and statistics (JUST):

1. **ABET Committee:** preparing ABET-standard portfolios for the Math. Courses.
2. **Student Recruitment:** Advising and enrolment for the freshmen of math major.
3. **Graduate Studies Committee:** Monitoring the progress of the master students and developing the curriculum of the master program at the department.
4. **Scientific Research Committee:** refereeing and evaluating the research proposals submitted by students and their advisors towards master theses.
5. **Syllabus Committee:** developing curriculums for the master and bachelor programs.
6. **Recruitment Committee:** collecting and organizing the data of all applicants for positions at the mathematics department.
7. **Social Committee:** organizing invitations and occasion gatherings for the faculty and staff of the department.
8. **Final Exam Grade Reassessment Committee:** reassessment of students grades in the final exam upon a written request by the student.
9. **Library Committee:** pertaining the connection between the Math. Dept. and the main library of the university for enhancing the library with titles in mathematics.

• (CW2) Activities

1. Chief organizer for the high school competition in mathematics hosted by Jordan University of Science and Technology for the years of 2009 and 2011.
2. The administrator for the election process for the student union (math. dept. division) for the years of 2007, 2010, and 2012.
3. Organizer and a referee for the soccer tournament for students at the math. department.

ACADEMIC SCHOLARSHIPS AND DEVELOPMENT (ASD)

• (ASD1) Academic Honors and Scholarships

-- A scholarship from Jordan University of Science and Technology to obtain the Ph.D. in Mathematics from New Mexico State University, USA.

• (ASD2) Academic Development Workshops

1. **Problem-Based Learning**, the Academic Development Center, Jordan University of Science and Technology. August, 2018.
2. **Curriculum Development and Course Planning**, the Academic Development Center, Jordan University of Science and Technology. July, 2017.
3. **Open Educational Resources**, the Academic Development Center, Jordan University of Science and Technology. Sep, 2015.
4. **Modern Methods in University Teaching**, the Academic Development Center, Jordan University of Science and Technology. Oct, 2009.
5. **Testing and Evaluation "University Examinations"**, the Academic Development Center, Jordan University of Science and Technology. July, 2005.

• (ASD3) Members of Committees

- (i) Commutative Algebra Organization, www.commalg.org
- (ii) American Mathematical Society, 1999-2004.

CONFERENCES AND WORKSHOPS: Talks and Attending

1. Normality of Monomial Ideals via the Newton Polyhedron, Seminar at dept. of Math. at SQU, October 2020.
2. Newton polyhedron and normality of monomial ideals, Turkish-Algerian International Days on Mathematics, Istanbul, September 2013.
3. An algorithm for computing the Newton Polyhedron. International conference on computational sciences. Omaha, Nebraska, June 2012.
4. Integral closure of certain monomial curves, Jordan Univ. Scientific Day, May 2006.
5. Gröbner Bases, Mathematics Seminar, Department of Mathematics, New Mexico State University, March 2003.
6. The Ratliff-Rush Closure, Mathematics Seminar, Department of Mathematics, New Mexico State University, April 2003.
7. Fields Institute Summer School & Conference, "Valuation Theory and Integral Closure in Commutative Algebra", University of Ottawa, Ottawa, Canada, July 2006.
8. VIGRE Mini-Course "Classical Problems in Commutative Algebra", University of Utah, Salt Lake City, Utah, USA, June 2004.
9. Computational Commutative Algebra Workshop. Mathematical Research Institute (MSRI), Berkley, California, March 2003.
10. CBMS lecture series "Solving System of Polynomial Equations", Texas A&M University, College Station, Texas, USA, May 2002.

REFERENCES

1. Irena Swanson, Professor, Chairman of Department of Mathematics, Purdue University, West Lafayette, Indiana, USA. Email: irena@purdue.edu
2. David Finston, Professor, Department of Mathematics, New Mexico State University, Las Cruces, New Mexico, USA. Email: dfinston@nmsu.edu
3. Mahmoud Alrefaei, Dean of Graduate Studies, Jordan University of Science and Technology, Jordan. alrefaei@just.edu.jo