

Ministry of Higher Education and Scientific research



Salahaddin University-Erbil

College of Engineering

Department of Mechanical & Mechatronics Engineering

Subject: Research Methods and Academic Publication Ethics

Course Book and Weekly Plan

Lecturer's name: Ahmed Samir Anwar

Academic Year: Fall Semester-2022-2023

Course Book

1. Course name	Research Methodology and academic publication ethics
2. Lecturer in charge	AHMED SAMIR, Lecturer
3. Department/ College	Mechanical & Mechatronics Dept./Engineering College
4. Contact	e-mail: ahmed.anwar@su.edu.krd Tel: (optional)
5. Time (in hours) per week	Fully theoretical Lecture: 4 h
6. Office hours	6 h
7. Course code	3122
8. Teacher's academic profile	Ph.D. P.E. Material Science & Welding Metallurgy M.Sc. P.E. Material Science & Welding Metallurgy
9. Keywords	RM; Research Methodology; ASA
<p>10. Course overview:</p> <p>This course aims to expound and give an overview of some essential information regarding research methods. It guides the researcher to follow the paper in systematic ways; from choosing a topic to referencing. This may help the students in all stages of the undertaken project.</p> <p>The course begins with an introduction to the various welding processes, including gas welding, arc welding, and resistance welding. Students will explore the advantages, limitations, and practical considerations associated with each process, enabling them to make informed choices based on the requirements of a given welding project.</p> <p>The course then delves into the heat flow and thermal cycles during welding. Students will learn about heat sources, heat transfer mechanisms, and the resulting thermal cycles experienced by the welded materials. Understanding these concepts is crucial for predicting the microstructural changes and their influence on the mechanical properties of welded joints.</p> <p>The course also covers welding defects and inspection techniques. Students will learn to identify and analyze various types of defects during welding, such as porosity, cracks, and incomplete fusion. They will gain an understanding of non-destructive and destructive testing methods used to assess the quality and integrity of welds, including visual inspection, radiography, ultrasonic testing, and mechanical testing.</p> <p>Advanced welding techniques and emerging trends in welding metallurgy are explored in the latter part of the course. Students will be introduced to cutting-edge technologies such as laser welding, electron beam welding, and friction stir welding. They will also explore the impact of additive manufacturing (3D printing) on the welding field, welding automation and robotics.</p>	

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Throughout the course, students will have the opportunity to apply their knowledge through hands-on laboratory sessions and welding exercises. This practical experience will reinforce the theoretical concepts covered in the lectures and allow students to develop their skills in welding metallurgy.

By the end of the Welding Metallurgy course, students will have gained a comprehensive understanding of the metallurgical principles underlying welding processes. They will be equipped with the knowledge and skills necessary to analyze and select appropriate welding materials, identify and prevent welding defects, and produce high-quality welded joints. Whether pursuing a career in welding, materials engineering, or related fields, this course provides a solid foundation for success in the realm of welding metallurgy.

11. Course objective:

1. Students will be able to understand the definition of research and how to conduct a research project.
2. Students will also be able to determine the importance of a research study.
3. Students will be able to make a difference among the various types of research investigation.
4. Students will also be able to learn about the importance of ethical parameters in a research study.
5. Students will be able to understand different research methods, such as qualitative, quantitative, and mixed methods (triangulation), and the advantages and disadvantages of each method.
6. Students will be able to be familiar with different techniques and procedures for writing a research paper, such as surveys, questionnaires, and interviews.
7. Students will be able to analyze and evaluate a research paper regarding validity, reliability, and ethical considerations.
8. Students will be able to understand various ways of sampling.

12. Student's obligation

Students have certain obligations and responsibilities to maximize their learning experience and make the most of the Welding Metallurgy course. These obligations include:

1. Active Participation: Students are expected to actively participate in all aspects of the course, including attending lectures, engaging in class discussions, and asking questions when clarification is needed. Active participation fosters a deeper understanding of the subject matter and encourages a dynamic learning environment.
2. Timely Completion of Assignments: Students must complete assignments and submit them within the given deadlines. Timely completion demonstrates responsibility and allows for constructive feedback from instructors, enabling students to improve their understanding of welding metallurgy concepts and their practical application.

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3. Preparation for Classes: Students should come prepared to each class by reviewing assigned readings, lecture notes, and any pre-class materials. This preparation helps students grasp the content more effectively and contributes to meaningful class discussions.

4. Laboratory Safety: During laboratory sessions or practical exercises, students must adhere to safety protocols and guidelines. This includes wearing appropriate personal protective equipment (PPE), following proper handling procedures for welding equipment and materials, and being mindful of potential hazards in the welding environment.

5. Respect for Peers and Instructors: Students are expected to treat their peers and instructors with respect, fostering a positive and inclusive learning environment. This includes active listening, offering constructive feedback, and maintaining professionalism in all interactions.

6. Attendance and Punctuality: Regular attendance and punctuality are essential for optimal learning. Students should attend all lectures, laboratory sessions, and any scheduled group activities. If unable to attend, students should inform the instructor in advance and make arrangements to catch up on missed material.

7. Utilization of Resources: Students are encouraged to utilize available resources such as textbooks, reference materials, online resources, and supplementary readings to enhance their understanding of welding metallurgy. They should also take advantage of opportunities for additional support, such as office hours or tutoring services, if needed.

8. Academic Integrity: Students must uphold high standards of academic integrity by avoiding plagiarism, cheating, or any form of dishonesty in their coursework or examinations. Proper citation and acknowledgement of sources should be practiced when referencing external information.

9. Continuous Learning: As the field of welding metallurgy evolves, students should demonstrate a commitment to lifelong learning. They should remain updated on industry advancements, emerging technologies, and research in welding metallurgy, and actively seek opportunities to expand their knowledge beyond the course curriculum.

By fulfilling these obligations, students can optimize their learning experience in the Welding Metallurgy course, develop a solid foundation in welding metallurgy principles, and enhance their skills in the application of welding processes and materials. These obligations not only contribute to individual academic growth but also promote a collaborative and engaging learning environment for all participants.

13. Forms of teaching

Powerpoint presentation sessions,
Weekly 4 h Theoretical Lectures

14. Assessment scheme

Award credit points it is necessary to pass the module exam.

The module exam (Theoretical + Practical) → [Written 120 min for Theoretical + 30 min Practical Exam]

Student attendance is required in all classes. If the absences exceed 10%, the student will be terminated from the class.

The students should succeed in the midterm & the lab exams; otherwise, the student will lose the chance of final exam participation & will be terminated from the class.

15. Student learning outcome:

Learning Outcomes: Welding Metallurgy

Upon completing the Welding Metallurgy course, students can expect to achieve the following learning outcomes:

1. **Comprehensive Understanding:** Students will have a comprehensive understanding of the fundamental principles of metallurgy as they apply to welding processes. They will grasp the relationship between metallurgical factors and welding outcomes, enabling them to make informed decisions in selecting welding materials, processes, and parameters.
2. **Knowledge of Welding Processes:** Students will be able to identify and differentiate between various welding processes, including gas welding, arc welding, and resistance welding. They will understand the advantages, limitations, and practical considerations associated with each process, allowing them to select the most suitable method for specific welding applications.
3. **Analysis of Microstructural Changes:** Students will be able to analyze and interpret the microstructural changes that occur during welding, such as solidification, grain growth, and phase transformations. They will understand the influence of welding parameters and thermal cycles on microstructural characteristics, and their subsequent impact on the mechanical properties of welded joints.
4. **Selection of Welding Materials:** Students will gain the ability to evaluate and select appropriate welding materials for specific applications. They will consider factors such as material properties, alloying elements, and heat treatment to ensure compatibility and optimize weldability. They will also understand the importance of material selection in achieving desired mechanical performance and structural integrity.
5. **Prevention and Mitigation of Welding Defects:** Students will be able to identify common welding defects, understand their causes, and develop strategies for their prevention and repair. They will acquire knowledge of preventive measures and appropriate techniques to mitigate defects such as porosity, cracks, and incomplete fusion, ensuring the production of high-quality welded joints.

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6. Practical Application of Skills: Through hands-on laboratory sessions and welding exercises, students will develop practical skills in preparing welding joints, selecting welding parameters, and executing welding processes. They will gain proficiency in the use of welding equipment and tools while adhering to safety guidelines, translating theoretical knowledge into practical application.

7. Awareness of Advanced Techniques and Emerging Trends: Students will be exposed to advanced welding techniques, such as laser welding, electron beam welding, and friction stir welding. They will understand their advantages, limitations, and potential applications in various industries. Additionally, students will be aware of emerging trends in welding metallurgy, including additive manufacturing (3D printing) and welding automation, allowing them to stay informed about the latest developments in the field.

8. Critical Thinking and Problem-Solving: Students will develop critical thinking skills and problem-solving abilities through the analysis of welding metallurgy challenges. They will be able to evaluate complex welding scenarios, consider multiple factors, and propose effective solutions to optimize welding outcomes and address specific welding-related issues.

9. Continuous Learning and Professional Development: Students will recognize the importance of lifelong learning in the field of welding metallurgy. They will be equipped with the foundational knowledge and skills necessary to pursue further education, professional certifications, or career advancement opportunities in welding, materials engineering, or related fields.

By achieving these learning outcomes, students will possess a solid understanding of welding metallurgy principles, practices, and applications. They will be prepared to apply this knowledge to real-world welding projects, contribute to the advancement of the welding industry, and pursue further studies or professional development opportunities in the field of welding metallurgy.

16. Course Reading List and References:

- James D. Lester "Writing Research Papers" Sixteenth Edition
- C.R. KOTHARI "Research Methodology" Second Revised Edition

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17. The Topics: Weekly Plan – Fall Semester 2022-2023

Week No.	Subject Details	
	Theoretical Part	Practical Part
11/09/2022 Week 1	Registration for the semester	N/A
20/09/2022 Week 2	Introduction to engineering research	N/A
27/09/2022 Week 3	Objectives of Research	N/A
04/10/2022 Week 4	Types of Research	N/A
11/10/2022 Week 5	Engineering ethics Journal quality and Indexes	N/A
18/10/2022 Week 6	Midterm Exam	N/A
25/10/2022 Week 7	Literature search and review	N/A
01/11/2022 Week 8	Measures of research impact	N/A
08/11/2022 Week 9	Project Exam	N/A
15-22/11/2022 And 10	Types of publications & Literature review	N/A
And 11	Managing archival library	N/A
29/11/2022 Week 12	Mendeley	N/A
10/12/2022	Final Semester Exam	N/A

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19. Examinations:

1. *Compositional:*

2. *True or false type of exams:*

3. *Multiple choices: 660 types of MCQ questions with answer keys has been provided with in extra document*

20. Extra notes:

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