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# CPE703: Research Methodology

## Course Introduction

Prof. Gheith Abandah

أ.د. غيث علي عبندة

# Outline

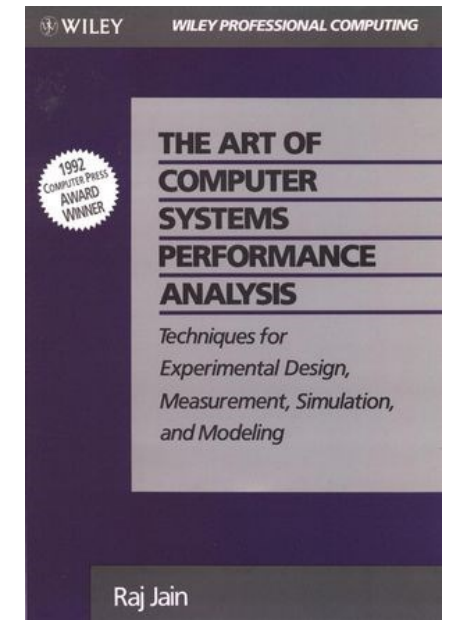
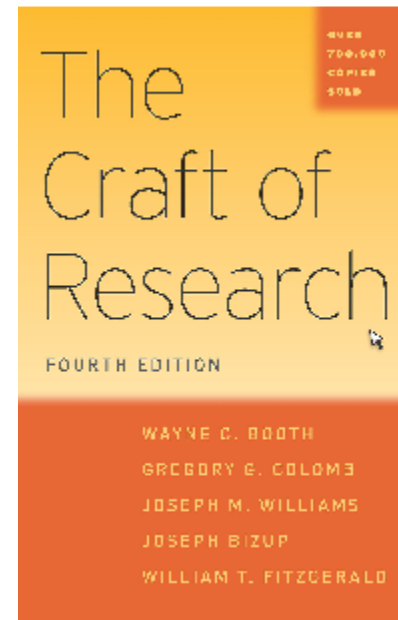
- Course Information
- Textbook and References
- Course Objectives and Outcomes
- Course Topics
- Grading
- Policies
- Important Dates

# Course Information

- Instructor: **Prof. Gheith Abandah**
- Email: **abandah@ju.edu.jo**
- Office: **CPE 406**
- Home page: **<http://www.abandah.com/gheith>**
- MS Team: **[Link](#)**
- Prerequisites: **None**
- Office hours: **Sun – Thu, 13:00 – 14:00**

# Textbooks

1. Wayne Booth, George Colomb, Joseph Williams, Joseph Bizup, and William FitzGerald, **The Craft of Research**, 4th Edition, The University of Chicago Press, 2016.
2. Raj Jain, **The Art of Computer Systems Performance Analysis**, Wiley, 1991.
3. Course slides at:  
[https://www.abandah.com/gheith/?page\\_id=3115](https://www.abandah.com/gheith/?page_id=3115)



The image is a screenshot of a website for Prof. Gheith A. Abandah. At the top, there are social media icons for Facebook, Twitter, LinkedIn, Instagram, and Google+. Below the icons is the name 'Prof. Gheith A. Abandah' in a large, bold, black font. Underneath the name is the text 'Personal and Professional Site'. There is a navigation menu with links for 'HOME', 'ABOUT', 'RESEARCH', and 'COURSES'. The main content area is divided into two columns. The left column has a heading 'Research Methodology – Spring 2022' and lists course details: 'Course No: 0907703', 'Course Name: Research Methodology', and 'Microsoft Team: Link'. It also lists textbooks and handouts/slides. The right column features a search bar, a circular portrait of Prof. Gheith Abandah, and a brief bio: 'Prof. Gheith Abandah, Professor in the University of Jordan and holds a PhD in Computer Science and Engineering from the University of Michigan.'

# References

4. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, 6th ed., Morgan Kaufmann, Elsevier Inc., 2017.
5. Peter Bock, Getting It Right: R&D Methods for Science and Engineering, Academic Press, 2001.
6. C.R. Kothari, Research Methodology, Methods and Techniques, 2nd Edition, New Age International Publishing, 2004.

# Course Objectives

Introduce the main research methodologies in AI and Computer Engineering to the graduate student. It is designed to achieve the following objectives:

- Provide awareness about research methodologies and performance evaluation and benchmarking
- Introduce various sources of information for literature review and data collection
- Develop an understanding of the ethical dimensions of conducting applied research and engineering responsibility
- Appreciate the components of scholarly writing and evaluate its quality
- Introduce measurement tools and techniques
- Introduce various experiment design methodologies
- Introduce trace driven and execution driven simulation

# Program Learning Outcomes (PLO)

1. Analyze and discuss the basic concepts, principles, techniques, and theories in AIR including artificial neural networks, machine learning, data science, industrial and service robots, and intelligent and autonomous robots.
2. Use critical thinking on concepts, principles, and practices related to AIR, and rigorously evaluate tools, techniques, and outcomes using structured arguments based on subject knowledge.
3. Apply the methods and techniques of AIR in the design, analysis, and deployment of AIR solutions and solving practical problems.

# Program Learning Outcomes (PLO)

4. Show the ability to produce distinguished research work from problem inception to implementation, and write quantitative and qualitative reports, and deliver them orally and in writing.
5. Demonstrate life-long learning, independent self-learning, and continuous professional development skills, and apply new AIR knowledge.
6. Take responsibility, work effectively within a team, abide by professional ethics and societal values in performing tasks and work, and apply work ethics and professional honor codes.
7. Use practical research methodologies to analyze and investigate issues related to AIR.



# Intended Learning Outcomes (ILO)

No	ILO	PLO
1	Define research; explain and apply research terms; describe the research process and the principal activities, skills and ethics associated with the research process.	4, 5, 6, 7
2	Demonstrate the ability to choose methods appropriate to research aims and objectives.	5, 7
3	Understand the limitations of research methods.	5, 7
4	Develop skills in qualitative and quantitative data analysis and presentation.	2, 4
5	Understand the importance of research ethics and integrate research ethics into the research process.	6
6	Develop advanced critical thinking skills.	2
7	Demonstrate enhanced writing and presentation skills.	4

# Course Topics

Topic	Week	ILOs	Resources
Research, Researchers, and Readers	1	1	1(I)
Asking Questions, Finding Answers	2	1	1(II)
Making an Argument	3	1	1(III)
Writing Your Argument	4	1, 7	1(IV)
The Ethics of Research	5	1, 5	1(V)
Engineering Responsibility and Ethical Issues	6	5	3

# Course Topics

Topic	Week	ILOs	Resources
Performance Evaluation Introduction, Common Mistakes, Selection of Techniques and Metrics	7	2, 3, 4	2(1-3)
Types of Workloads, Workload Selection, Monitors	9	2	2(4-7)
Data Presentation, Ratio Games	10	4	2(10-11)
Summarizing Measured Data, Comparing Systems	11	4	2(12-13)
Introduction to Experimental Design, 2k Factorial Designs	12	2, 3, 4	2(16-17)
Introduction to Simulation, Analysis of Simulation Results	13	2	2(24-25)
Project Presentations	14	1 – 7	1-6

# Grading

- Midterm Exam 30%
- Term Project's Report and Presentation 30%
- Final Exam 40%

# Policies

- Attendance is required
- Makeup exams need acceptable absence cause
- All submitted work must be yours
- Cheating will not be tolerated
- Open-book exams
- Join the Microsoft Team at: [Link](#)
- Check department announcements at:  
<https://www.facebook.com/profile.php?id=100087040924274>

# Important Dates

Tue 17 Oct 2023	First Lecture
Tue 5 Dec 2023	Midterm Exam
Tue 12 Dec 2023	Term project proposal is due
Tue 9 Jan 2024	Last Lecture
Tue 16 Jan 2024	Term project report is due and project demonstrations
Tue 16 Jan 2024	Last Date to Withdraw
Wed 17 – Mon 29 Jan 2024	Final Exam Period