The Hashemite University
Faculty of Science
Department of Physics

Course Title:	Mathematical Physics (I)	**Course Number:**	110102281
Semester:	Fall	**Year:**	2023/2024
Designation:	Compulsory	**Prerequisite(s):**	110102102
Instructor:	Dr. Gassem Alzoubi	**Instructor's e-mail:**	gassem@hu.edu.jo
		Webpage:	http://staff.hu.edu.jo/gassem
Office Hours:	Sunday, Tuesday, and Thursday,10:00 –11:00 Am, Physics Building, Room # 107		

Course Description (catalog): Physics 281 is the first course in a two-semester sequence of mathematical physics courses for physics majors. It introduces students to a variety of basic mathematical tools that will be used in subsequent physics courses.

. **Textbook(s) and/or Other Supplementary Materials:**

Textbook: Mathematical Methods in the Physical Sciences, third edition by Mary L. Boas (Wiley, New York, 2006)

References:
(1) Mathematical Methods for Physicists, 6th edition by George B. Arfken and Hans J. Weber (Academic Press, Elsevier, 2013)

(2) Mathematical Methods for Physics and Engineering, third Edition by K. F. RILEY, M. P. HOBSON and S. J. BENCE (Cambridge University Press, 2006)
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Major Topics Covered:

Topics	No. of Weeks	Contact hours*	Chapter in Text	Sections	Suggested Problems (from textbook 3d edition)
Complex Numbers	2	6	2	2.1-2.5, 2.8-2.16	**HW#1:** 2.4.4, 2.5.6, 2.5.29,2.5.47, 2.5.49, 2.5.59, 2.5.68, 2.9.12, 2.9.26-28, 2.9.33, 2.9.35, 2.9.38, **HW#2:** 2.10.4, 2.10.19, 2.10.28, 2.11.10, 2.11.14, 2.12.8, 2.12.16, 2.12.20, 2.12.27, 2.14.1, 2.14.7, 2.14.13, 2.14.18, 2.17.19, 2.17.22,
Linear Algebra	4	12	3	3.1-3.9, 3.11-3.12	**HW#3**: 3.2.3, 3.2.5-6, 3.2.12, 3.3.1, 3.3.15-16, 3.4.15, 3.4.18, 3.5.1-2, 3.5.4, 3.5.28-29, 3.5.33, 3.5.41, **HW#4**: 3.6.7, 3.6.9, 3.6.10, 3.6.21, 3.6.30, 3.7.2, 3.7.5, 3.7.7-9, 3.7.12-13, 3.7.23, 3.7.26, 3.7.29, 3.7.32, 3.7.34, **HW#5**: 3.8.2, 3.8.10, 3.8.15, 3.9.1, 3.9.5, 3.9.17, 3.9.19, 3.9.23, 3.11.9-10, 3.11.12, 3.11.16, 3.11.43, 3.11.24,
First Exam					
Vector Analysis	3	9	6	6.1-6.11	**HW#6**: 6.3.7, 6.3.12, 6.3.14, 6.3.20(a), 6.4.2, 6.4.4, 6.4.6, 6.4.9, 6.6.8, 6.6.13, 6.7.6, 6.7.12, 6.7.10, 6.7.16, 6.7.18-20 **HW#7**: 6.8.1, 6.8.6, 6.8.19-20, 6.9.2, 6.9.5-7, 6.10.4, 6.10.6, 6.10.10-11, 6.11.2, 6.11.8-11
Fourier Series and Transforms	3	9	7	7.1, 7.4-7.5, 7.7-7.11	**HW#8:** 7.4.7, 7.4.14, 7.4.16(a), 7.5.2, 7.5.8, 7.7.1, 7.8.13(a), 7.9.1-3, 7.9.5, 7.9.10, 7.9.15, 7.11.5-6, 7.12.3, 7.12.23,
Second Exam					
Ordinary	3	9	8	8.1-8.7	**HW#9:** 8.2.6, 8.2.17, 8.2.20, 8.2.23,

Differential Equations					8.3.3, 8.3.8, 8.3.18, 8.4.2, 8.4.9 **HW#10**: 8.5.1-3, 8.5.10, 8.5.19, 8.5.33-34, 8.5.36, 8.5.36, 8.6.1-3, 8.6.8, 8.6.10-11, 8.6.21, 8.6.26, 8.6.34, 8.6.39, 8.7.2-3, 8.7.17, 8.7.27,
Final Exam					
Total	**15**	**45**			

*Contact hours include lectures and exams

Specific Outcomes of Instruction (Course Learning Outcomes):
After completing the course, the student will be able to:

	Course Learning Outcomes (CLO)	(SO*)
CLO1.	Develop fundamental mathematical methods, techniques, and skills required for a physics major as an integral part of the student's overall education	(a), (k), (i)
CLO2.	Use linear algebra, vector calculus, and matrices to solve problems in different physics applications	(a), (k)
CLO3.	Demonstrate the ability to solve first and second order linear differential equations in various fields of physics, such as mechanics and electricity	(a), (e) (k)

(SO*) = Student Outcomes Addressed by the Course.

Student Outcomes (SO) Addressed by the Course:

#	Outcomes Description	Contribution
	Applied and Natural Sciences Student Outcomes	
(a)	an ability to apply knowledge of mathematics, science, and applied sciences	**H**
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to formulate or design a system, process or program to meet desired needs	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify and solve applied sciences problems	**L**
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of solutions in a global and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.	**M**
H = High, M = Medium, L = Low		

Grading Plan:

1st Exam	30 Points	**TBA**
2nd Exam	30 Points	**TBA**
Final exam	40 Points	**TBA**

General Notes: **Attendance Policy:** students are expected to attend every class and arrive on time in compliance with HU regulations. In case you find yourself in a situation that prevents you from attending class or exam, you have to inform your instructor. If you miss more than 6 classes for the (Sunday, Tuesday, and Thursday model) or 4 classes for the (Monday and Wednesday Model), you cannot pass the course. Makeup excuses will be accepted only for very limited justified cases, such as illness and emergencies.

Prepared by: Dr. Gassem Alzoubi **Date:** Oct, 8, 2023