



Academic Course Specification Form

استمارة توصيف المقرر الأكاديمي

القسم الخاص بالطالب Section Concerning the Student

1. Course Code:	MATHS 383	1. رمز المقرر:
2. Course Title	Methods of Applied Mathematics I	2. اسم المقرر:
3. College:	College of Science	3. الكلية:
4. Department:	Department of Mathematics	4. القسم:
5. Academic Program:	Bachelor of Science in Mathematics	5. البرنامج الأكاديمي:
6. Course Credits:	3-0-3	6. عدد الساعات المعتمدة:
7. Course NQF Level	8	7. مستوى المقرر وفقاً للإطار الوطني للمؤهلات:
8. Notional Hours:	133	8. عدد الساعات الافتراضية:
9. NQF Credits	13	9. عدد الساعات المعتمدة للمقرر وفقاً للإطار الوطني للمؤهلات:
10. Prerequisite:	MATHS 205 + MATHS 233	10. المتطلب المسبق للمقرر:
11. Lectures Timing & Location:	UTH (10:-10:50)	11. وقت المحاضرة ومكانها:
12. General Mode of Teaching and Learning	Tranditional تقليدي	12. النمط العام للتعليم والتعلم:
13. Course Coordinator:	TBA	13. منسق المقرر:
14. Course Instructor:	TBA	14. مدرس المقرر:
15. Office Hours and Location:	TBA	15. الساعات المكتبية ومكانها:
16. Instructor's Email:	TBA	16. البريد الإلكتروني لمدرس المقرر:
17. Academic Year:		17. السنة الأكاديمية:
18. Semester:	First Semester الفصل الأول	18. الفصل الدراسي:

19. Textbook(s):		19. الكتب الدراسية للمقرر:
■ Introduction to the Special Functions of Mathematical Physics with Applications to the Physical and Applied Sciences, John Michael Finn, 2005. ■ Partial Differential Equations and Boundary Value Problems with Fourier Series, N. H. Asmar, Prentice Hall, 2004.		
20. References:		20. المراجع:
■ Fourier Analysis and its Applications, G. Folland, AMS, 2009. ■ Special functions and their applications, by Lebedev& Silvenna. ■ Mathematical methods for physics by Arkfen and Weber, 6 edition 2005. ■ Mathematical Methods in Science and Engineering, S Boyin, second edition, Wiley, 2018. ■ Elementary applied partial differential equation with Fourier series by Richard Harberman. ■ Special functions of mathematics for engineers by Larry C. Andrews, second edition Oxford University Press, 2003.		
21. Other learning resources used (e.g. e-Learning, field visits, periodicals, software, etc.):		21. مصادر أخرى (مثال : التعلم الالكتروني، زيارات ميدانية، دورات، برامج كمبيوتر، الخ....)
University Official Platforms (BB & MT)		
22. Course Description (as published in the College Catalogue):		22. توصيف المقرر (حسبما ورد في دليل الكلية):
This course explores concepts of Separation of Variables, Power Series, Sturm-Liouville Problems, Special Functions (Gamma, Beta, and Error functions), and Partial Differential Equations. Emphasis is placed on computational implementation of these mathematical concepts to solve real-word problems.		
23. Course Intended Learning Outcomes (3 to 5 CILOs):		23. مخرجات التعلم للمقرر (CILOs) (3 إلى 5 مخرجات تعليمية):
1. Represent functions using Fourier series or Legendre polynomials. 2. Evaluate integrals using different forms of Gamma, Beta and Error functions. 3. Use power series and Bessel functions to solve ordinary differential equations. 4. Identify separation of variables using boundary value problems. 5. Solve real-word problems computationally using specialized software.		
24. Course Assessment Percentages (As per Regulations of Study and Examination at the University of Bahrain):		24. أساليب التقويم ونسبها المئوية (بحسب نظام الدراسة والامتحانات في جامعة البحرين):
Computational Tasks📌		20%
TEST#1		20%
TEST#2		20%
EXAM		40%
Total		100%
📌 This component of course assessments comprise at least two tasks per semester.		
25. Description of Topics Covered:		25. وصف الموضوعات التي ينبغي تناولها:
Topic Title (e.g. chapter/experiment title) الموضوع		Description التفصيل
Chapter 03 – First Book		The Gamma Function and Related Functions, Error Function
Chapter 03 – First Book		Other Functions Defined by Integrals
Chapter 02 – Second Book		Fourier Series, Sine and Cosine Series
Chapter 03 – Second Book		Heat Equation with Non-Zero Boundary, Laplace Equation
Chapter 05 – Second Book		Legendre Polynomials and Bessel Functions
Chapter 06 – Second Book		BVP and Sturm-Liouville Problems

26. Weekly Schedule			26. الجدول الأسبوعي:	
Week الإسبوع	Date التاريخ	Topics Covered المواضيع المعروضة	CILOs المخرجات التعلمية للمقرر (CILOs)	Teaching/Assessment Mode and Method منهجية ونمط التدريس/التقييم
01		Chapter 2 – Book#2 Fourier Series	1	Traditional Teaching تدريس تقليدي
02		Computational Task Signal Analysis Numerically Fast Fourier Transform	1, 5	
03		Chapter 3 – Book#2 Separation of Variations of Boundary Value Problems Example: Heat Equation with Zero Temperatures at Ends Computational Task Plotting the Behavior of the Heat Wave Distribution	4, 5	
04		Chapter 6 – Book#2 Heat Equation with Non-Zero Boundary Conditions Application Vibration on a String Heat Equation: Varying Boundary Conditions Computational Task Solving Heat Transformation for Different Initial Boundary Conditions	4, 5	
05		Chapter 6 – Book#2 Laplace Equation for the Wave and Heat Equations Computational Task Steady-State Heat Distribution in a CPU Chip Steady Temperature in a Square Plate Real-Life Physics Setup	4, 5	
06		Chapter 5 – Book#2 Sturm-Liouville Eigenvalue Problems	4	
07		Chapter 5 – Book#2 Sturm-Liouville Eigenvalue Problems	4	
08		Chapter 5 – Book#2 Applications for Sturm-Liouville Computational Task Mathematical Modelling: One-Dimensional Heat Equation, Evaluation of Eigenvalues, Eigenvectors, Finding Solution at Various Points in Space and Time	4, 5	
09		Chapter 3 – Book#1 Gamma, Beta, and Error Functions	2, 5	
10		Chapter 3 – Book#1: Gamma, Beta, and Error Functions Computational Task Real-Life Applications: Example Drug Concentration Example Modeling Population Growth	2, 5	
11		Chapter 5 – Book#2 Bessel Functions Computational Task Computing the Zeros of Bessel Function Plot the Radial Modes of Bessel Function	3, 5	
12		Chapter 3 – Book#2 Application: Solving ODE via Power Series Computational Task Airy's Equation: It is a fundamental equation in physics for modeling diffraction of light, quantum mechanics and tunneling.	3, 5	
13		Chapter 3 – Book#2 Legendre Polynomials	1	

14		Chapter 3 – Book#2 Application of Legendre Polynomials	1	
15		Computational Task Using Legendre Polynomial to find Electric Potential on a Circular Disk	5	

27. Academic Integrity Statement:	27. بيان النزاهة الأكاديمية:
Students are to observe the highest level of honesty and academic ethics in pursuit of their academic goals as per UOB Regulations of Student Conduct and Academic Integrity, Anti-plagiarism Policies , and Students' Rights and Responsibilities Handbook . The consequences for cheating, plagiarism, unauthorized collaboration, and other forms of academic dishonesty can be very serious and will be dealt with as per the aforementioned policies and regulations.	يعتبر الصدق والنزاهة عنصراً أساسياً في العملية الأكاديمية. حيث يُتوقع من الطلاب خلال سعيهم لتحقيق أهدافهم الأكاديمية التحلي بالأمانة والأخلاق في جميع الأوقات، وذلك وفقاً للوائح والأنظمة الخاصة بطلبة جامعة البحرين، بالإضافة إلى دليل حقوق الطلبة وواجباتهم ، وكما جاء في سياسة الانتحال الخاصة بجامعة البحرين . حيث سيتم التعامل مع أي انتهاك للنزاهة الأكاديمية بحسب ما تنص عليه السياسات والأنظمة السابق ذكرها.
28. Attendance and Absence Regulations:	28. نظام الحضور والغياب:
Students are required to adhere to regular attendance for class lectures and practical sessions, as determined by the nature of the course, as per Article (33), of Regulations of Study and Examination at the University of Bahrain .	يُتوقع من الطلاب الالتزام بالحضور المنتظم للساعات الصفية والعملية بحسب طبيعة المقرر، وفقاً للمادة (33)، من نظام الدراسة والامتحانات في جامعة البحرين .