جامعة البحرين
University of Bahrain
مركز ضمان الجودة والاعتماد الأكاديمي
Quality Assurance and Accreditation Center

Academic Course Specification Form

استمارة توصيف المقرر الأكاديمي

القسم الخاص بالطالب
Section Concerning the Student

1. Course Code:	MATHS 371	.1 رمز المقرر:
2. Course Title	Theory of Interest	.2 اسم المقرر:
3. College:	College of Science	.3 الكلية:
4. Department:	Department of Mathematics	.4 القسم:
5. Academic Program:	B.Sc. in Mathematics	.5 البرنامج الأكاديمي:
6. Course Credits:	3-0-3	.6 عدد الساعات المعتمدة:
7. Course NQF Level	8	.7 مستوى المقرر وفقا للإطار الوطنى للمؤهلات:
8. Notional Hours:	133	.8 عدد الساعات الافتراضية:
9. NQF Credits	13	.9 عدد الساعات المعتمدة للمقرر وفقا للإطار الوطنى للمؤهلات:
10. Prerequisite:	MATHS 132	.10 المتطلب المسبق للمقرر:
11. Lectures Timing & Location:	TBA	.11 وقت المحاضرة ومكانها:
12. General Mode of Teaching and Learning	تقليدي Tranditional عن بعد: غير المتزامن Distance: Asynchronous	.12 النمط العام للتعليم والتعلّم:
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:	الفصل الأول First Semester	.18 الفصل الدراسي:

Changing any elements of the form is strictly prohibited.
يرجى عدم تغيير أي عنصر من عناصر الاستمارة

19. Textbook(s):	.19 الكتب الدراسية للمقرر:
Mathematics of Investment and Credit'': Broverman, S.A., (Seventh Edition) 2017: ACTEX Publications.	
20. References:	**.20 المراجع:**

- Vaaler, L.J.F., Harper, S.K., and Daniel, J.W. Mathematical Interest Theory (Third Edition), 2019, The Mathematical Association of America, ISBN: 978-1-4704-4393-1.
- Kellison, S.G., The Theory of Interest (Third Edition), 2009, Irwin/McGraw-Hill, ISBN: 125921544X or 978-1259215445.
- Francis, J. and Ruckman, C., Interest Theory – Financial Mathematics and Deterministic Valuation; (Second Edition), 2018, ActuarialBrew, ISBN 978-0998160412.

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....)

Notes:
The following study notes are required reading:
- FM-24-17 Using Duration and Convexity to Approximate Change in Present Value. Sections 1-4 are required reading.
- FM-25-17 Interest Rate Swaps. The entire note is required reading.
- FM-26-17 Determinants of Interest Rates. The entire note is required reading.

Website:
- **Society of Actuaries - Exam FM website:** https://www.soa.org/education/exam-req/edu-exam-fm-detail.aspx
  Coaching Actuaries: www.coachingactuaries.com
  Infinite Actuaries: https://www.theinfiniteactuary.com/
- **Central Bank of Bahrain:** https://www.cbb.gov.bh/?adlt=strict&toWww=1&redig=A7FE79F463FC410896DBB17C21E41E97
- **Bahrain Bourse:** https://bahrainbourse.com/?adlt=strict&toWww=1&redig=D6EF88D4837B400291CA47E34C26645E

22. Course Description (as published in the College Catalogue):	.22 توصيف المقرر(حسبما ورد في دليل الكلية):

Introduction to the mathematics of interest and the evaluation of interest related products including annuities with non-contingent payments, loans, bonds, general cash flows, portfolios, and immunization.

23. Course Intended Learning Outcomes (3 to 5 CILOs):	.23 مخرجات التعلّم للمقرر (CILOs) (3 إلى 5 مخرجات تعلّمية):
1. Recognize different indicators related to interest rates.	
2. Evaluate time values of sequences of cash flows and non-contingent payments.	
3. Apply interest rate calculations to bonds and loans.	
4. Analyze cash-flows of return on investments and related risk.	
5. Construct basic interest rate risk mitigations.	

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):
OTHERS🕮	20%
TEST 1	20%
TEST 2	20%
EXAM	40%
Total	**100%**

🕮 This assessment includes regular assignments, homework, or quizzes with a minimum of two assessments per semester. These assessments are usually conducted using e-learning tools such as Blackboard, WebAssign, and ALEKS.

25. Description of Topics Covered:	25. وصف الموضوعات التي ينبغي تناولها:
Topic Title ***(e.g. chapter/experiment title)*** **الموضوع**	***Description*** **التفصيل**
Ch. 1 & 2: Time values of money and its characteristics, SOA FM readings	Different types on Interest Rates (simple, compounds, nominal, annualized, yield rate, IRR), Cash-flows and non-contingent payments: Valuations over time (present value, discounting, accumulated value, annuities).
Ch. 3 & 4: Loan Repayments and Bonds Valuations	Valuation of different types of bonds and loans repayments based on their characteristics (floating rates, zero-coupon bonds, etc.)
Ch. 5 & 6: Return on investment and Term Structure of Interest Rates	Internal rate of Return of investment and its Net Present Value. Interest Rate over time (spot Rates, forward Rates); Some interest rates derivatives: Forward Rate Agreement, Swaps on interest rates and loans.
Ch. 7: Cashflows duration and immunization; SOA FM Required readings	Different types of durations (Modified duration, Macaulay duration) on different types of cashflows (zero coupon bonds, coupon bonds and portfolio of bonds); Interest rate risk mitigation (immunization); notion of convexity; Determinants of Interest Rates (demand/supply of available funds; rates from central banks and retail rates; rates with respect to inflations)
Ch. 1 & 2: Time values of money and its characteristics, SOA FM readings	Different types on Interest Rates (simple, compounds, nominal, annualized, yield rate, IRR), Cash-flows and non-contingent payments: Valuations over time (present value, discounting, accumulated value, annuities).
Ch. 3 & 4: Loan Repayments and Bonds Valuations	Valuation of different types of bonds and loans repayments based on their characteristics (floating rates, zero-coupon bonds, etc.)
Ch. 5 & 6: Return on investment and Term Structure of Interest Rates	Internal rate of Return of investment and its Net Present Value. Interest Rate over time (spot Rates, forward Rates); Some interest rates derivatives: Forward Rate Agreement, Swaps on interest rates and loans.
Ch. 7: Cashflows duration and immunization; SOA FM Required readings	Different types of durations (Modified duration, Macaulay duration) on different types of cashflows (zero coupon bonds, coupon bonds and portfolio of bonds); Interest rate risk mitigation (immunization); notion of convexity; Determinants of Interest Rates (demand/supply of available funds; rates from central banks and retail rates; rates with respect to inflations).

26. Weekly Schedule				**26. الجدول الأسبوعي:**
Week **الإسبوع**	**Date** **التاريخ**	**Topics Covered** **المواضيع المعروضة**	**CILOs** **المخرجات التعلُمية للمقرر (CILOs)**	**Teaching/Assessment Mode and Method** **منهجية ونمط التدريس/التقييم**
01		**Ch. 1: Interest Rate Measurements:** 1.0 Introduction 1.1 Interest Accumulations and Effective Rates of Interest 1.2 Present Values (excluding 1.2.1) 1.3 Equation of Value	1, 2	Traditional Teaching **التعلم التقليدي**
02		**Ch. 1: Interest Rate Measurements:** 1.4 Nominal Rates of Interest 1.5 Effective and Nominal Rates of Interest 1.6 The Force of Interest 1.7 Inflation and the "Real" Rate of Interest	1, 2	
03		**Ch. 2: Valuation of Annuities:** 2.1 Level Payment Annuities 2.2 Level Payment Annuities – Some Generalizations	1, 2	
04		**Ch. 2: Valuation of Annuities:** 2.3 Annuities with Non-Constant Payments 2.4.1 Yield Rates and Reinvestment Rates 2.4.4 Book Value and Market Value	2	
05		**Ch. 3: Loan Repayment:** 3.1 The Amortization Method of Loan Repayment 3.2 Amortization of a Loan with Level Payments – Excluding 3.2.1, 3.2.2, 3.3 and 3.4)	3	
06		**Ch. 4: Bond Valuation:** 4.1 Determination of Bond Prices- excluding 4.1.3 4.2 Amortization of a Bond	3	
07		**Ch. 4: Bond Valuation:** 4.3 Callable Bonds: Optional Redemption Dates 4.4 Applications and Illustrations **Hands-On Excel 1**: Interest Rates, Annuities, Loan and Bonds	4, 6	
08		**Ch. 5: Measuring the Rate of Return of an investment:** 5.1 Internal Rate of Return Defined and Net Present Value 5.2 Dollar-Weighted and Time-Weighted Rate of Return 5.3 Applications and Illustrations – excluding investment year method portion in Subsection 5.3.1 and Subsections 5.3.2 to 5.3.4	1, 2	
09		**Ch. 6: The Term Structure of Interest Rate:** 6.1 Spot Rates of Interest and 6.3 Forward Rates of Interest only	4	
10		**Ch. 7: Cash Flow Duration and Immunization:** 7.1 Duration of a Set of Cashflows and Bond Duration (excluding 7.1.3 & 7.1.6) 7.2 Asset-Liability Matching and Immunization - 7.3 is excluded **Hands-On Excel 2:** Return on Investments, Duration and Immunization	5	
11		**Ch. 9. Advanced Topics in Equity, Investment and Financial Derivatives:** Only 9.1 The dividend Discount Model of Stock Valuation **Duration, Convexity and Swap: SOA – Exam FM readings:** 1. Introduction 2. Cash Flow Series and Present Value 3. Macaulay and Modified Duration 4. First Order Approximations of Present Value	1, 4, 5	
12		**Interest Rate Swap: SOA - Exam FM readings:** 1. Background 2. Definitions 3. General Formula 4. Special Formula 5. Net payments 6. Market Value 7. Conclusion	1, 4	

13		**Hands-On Excel 3:** Computing Rate of Swap, Net Payments and related values **Determinants of Interest Rates: SOA – Exam FM readings**: 1. Introduction 2. Background 3. Understanding the Components of the Interest Rate	4, 5	Distance: Asynchronous عن بعد: غير المتزامن
14		**Determinants of Interest Rates: SOA – Exam FM readings:** 4. Retail Savings and Lending Interest Rates 5. Bond Issues for Governments and Corporations	4	
15		The Role of Central Banks	4	

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 عنصران أساسيان في العملية الأكاديمية. حيث يُتوقع من الطلاب خلال سعيهم لتحقيق أهدافهم الأكاديمية التحلي بالأمانة والأخلاق في جميع الأوقات، وذلك وفقًا 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، وفقًا للمادة (33)، من نظام الدراسة والامتحانات في جامعة البحرين.