Academic Course Specification Form

استمارة توصيف المقرر الأكاديمي

القسم الخاص بالطالب
Section Concerning the Student

1. Course Code:	**BIOLS 464**	**1. رمز المقرر:**
2. Course Title	Molecular Biology of Oncogenes	**2. اسم المقرر:**
3. College:	Science	**3. الكلية:**
4. Department:	Biology	**4. القسم:**
5. Academic Program:	Bachelor of Science in Biology	**5. البرنامج الأكاديمي:**
6. Course Credits:	3-0-3	**6. عدد الساعات المعتمدة:**
7. Course NQF Level:	8	**7. مستوى المقرر وفقا للإطار الوطني للمؤهلات:**
8. Notional Hours:	140	**8. عدد الساعات الافتراضية:**
9. NQF Credits:	14	**9. عدد الساعات المعتمدة للمقرر وفقا للإطار الوطني للمؤهلات:**
10. Prerequisite:	BIOLS 360	**10. المتطلب السابق للمقرر:**
11. Lectures Timing & Location:		**11. وقت المحاضرة ومكانها:**
12. General Mode of Teaching and Learning	Traditional تقليدي	**12. النمط العام للتعليم والتعلّم:**

13. Course Coordinator:		**13. منسّق المقرر:**
14. Course Instructor:		**14. مدرّس المقرر:**
15. Office Hours and Location:		**15. الساعات المكتبية ومكانها:**
16. Instructor's Email:		**16. البريد الإلكتروني لمدرّس المقرر:**
17. Academic Year:		**17. السنة الأكاديمية:**
18. Semester:		**18. الفصل الدراسي:**

19. Textbook(s): **19. الكتب الدراسية للمقرر:**

1- Molecular Biology of Cancer: Mechanisms, Targets, and Therapeutics by Lauren Pecorino Pecorino, L. (2021). Molecular Biology of Cancer: Mechanisms, Targets, and Therapeutics (th ed.). Oxford University Press.

ISBN-13: 978-0198833024

2-

3- The Biology of Cancer by Robert A. Weinberg

Weinberg, R. A. (2013). The Biology of Cancer (2nd ed.). Garland Science.
ISBN-**13: 978-0815342205**

20. References: **20. المراجع:**

1- Cancer: Principles & Practice of Oncology by Vincent T. DeVita, Jr., Theodore S. Lawrence, and Steven A. Rosenberg

DeVita, V. T., Lawrence, T. S., & Rosenberg, S. A. (2020). Cancer: Principles & Practice of Oncology (11th ed.). Wolters Kluwer.
ISBN-13: 978-1496394637

2- The Molecular Basis of Cancer by John Mendelsohn, Peter M. Howley, Mark A. Israel, Joe W. Gray, and Craig B. Thompson

Mendelsohn, J., Howley, P. M., Israel, M. A., Gray, J. W., & Thompson, C. B. (2014). The Molecular Basis of Cancer (4th ed.). Elsevier.
ISBN-13: 978-1455740666

3- Cancer Genomics: From Bench to Personalized Medicine edited by John N. Weinstein, Stacey Gabriel, and Michael I. Jordan

Weinstein, J. N., Gabriel, S., & Jordan, M. I. (Eds.). (2013). Cancer Genomics: From Bench to Personalized Medicine. Springer.

ISBN-13: 978-1461475666

4- **Oncogenomics: Molecular Approaches to Cancer by Charles Brenner and David Duggan**

Brenner, C., & Duggan, D. (Eds.). (2004). Oncogenomics: Molecular Approaches to Cancer. Wiley-Liss.
ISBN-13: 978-0471264493

21. Other Learning Resources Used (e.g. e-learning, field visits, periodicals, software, etc.):	21. مصادر التعلّم الأخرى (مثال: التعلّم الإلكتروني، زيارات ميدانية، دوريات، برمجيات، إلخ....)

Journals and Articles

1. **Nature Reviews Cancer**
   - **Provides comprehensive and up-to-date review articles on all aspects of cancer research, including oncogenes and tumor suppressors.**
2. **Cancer Cell**
   - **A high-impact journal that publishes research articles and reviews on the molecular and cellular mechanisms of cancer.**
3. **Journal of Clinical Oncology**
   - **Offers cutting-edge research and reviews on clinical applications and implications of oncology research.**

Online Databases and Tools

1. **The Cancer Genome Atlas (TCGA)**
   - **An invaluable resource for genomic data on various types of cancers, including information on mutations in oncogenes.**
2. **OncoKB: Precision Oncology Knowledge Base**
   - **A curated database that provides information on the effects and treatment implications of specific cancer gene alterations.**
3. **NCBI Gene and Protein Databases**
   - **Essential for retrieving detailed information on specific oncogenes, their sequences, and their encoded proteins.**

Online Courses and Lectures

1. **Coursera: Cancer Biology Specialization**
   - **A series of courses covering various aspects of cancer biology, including molecular mechanisms, oncogenes, and therapeutic approaches.**
2. **edX: Fundamentals of Cancer Biology**
   - **An online course offering foundational knowledge in cancer biology, including the roles of oncogenes and tumor suppressors.**

Educational Websites and Portals

1. **National Cancer Institute (NCI)**
   - **Provides extensive resources on cancer research, including information on oncogenes, tumor suppressors, and targeted therapies.**
2. **American Cancer Society (ACS)**
   - **Offers educational materials and updates on the latest cancer research and treatments.**

Textbooks and Reference Books

1. **"Cancer Biology" by Raymond W. Ruddon**
   - **Ruddon, R. W. (2007). *Cancer Biology* (4th ed.). Oxford University Press.**
   - **ISBN-13: 978-0195175431**
2. **"Principles of Cancer Genetics" by Fred Bunz**
   - **Bunz, F. (2008). *Principles of Cancer Genetics*. Springer.**
   - **ISBN-13: 978-1402067835**

Research and Review Articles

1. **Hanahan, D., & Weinberg, R. A. (2000). The Hallmarks of Cancer. *Cell*, 100(1), 57-70.**
   - **DOI: 10.1016/S0092-8674(00)81683-9**
2. **Hanahan, D., & Weinberg, R. A. (2011). Hallmarks of Cancer: The Next Generation. *Cell*, 144(5), 646-674.**
   - **DOI: 10.1016/j.cell.2011.02.013**

22. Course Description (as published in the College Catalogue):	**22. توصيف المقرر (حسب ما ورد في دليل الكلية):**
Oncogenes; anti-oncogenes; genetic structure of oncogenes; regulation and biochemical properties of their encoded proteins.	
23. Course Intended Learning Outcomes (3 to 5 CILOs):	**23. مخرجات التعلّم للمقرر (CILOs) (3 إلى 5 مخرجات تعلّمية):**
1. Identify the fundamental concepts of oncogenes and anti-oncogenes.	
2. Analyze the genetic structure of oncogenes.	
3. Evaluate the regulation mechanisms of oncogenes.	
4. Explore the biochemical properties of oncogene-encoded proteins.	
5. Integrate knowledge of oncogenes in cancer research	

24. Course Assessment Percentages (as per Regulations of Study and Examination at the University of Bahrain):		24. أساليب التقييم ونسبها المئوية (بحسب نظام الدراسة والامتحانات في جامعة البحرين):	
Assessment **التقييم**	**Type** **النوع**	**Percentage** **النسبة**	**Assessment Date** **تاريخ التقييم**
Test 1	Individual فردي	*20%*	
Test 2	Individual فردي	*20%*	
Presentation	Individual فردي	*10%*	
Final Exam	Individual فردي	*40%*	
Assignments	Individual	*10%*	
Total	**100%**		

25. Description of Topics Covered	25. وصف الموضوعات التي ينبغي تناولها:
Topic Title ***(e.g. chapter/experiment title)*** **الموضوع**	***Description*** **التفصيل**
Chapter 1	**Chapter 1: Introduction to Cancer Biology** • Overview of cancer as a genetic disease. • Historical perspectives on cancer research. • Introduction to oncogenes and tumor suppressor genes.
Chapter 2	**Chapter 2: The Molecular Basis of Oncogenesis** • Genetic mutations and their roles in cancer. • Mechanisms of oncogene activation (e.g., point mutations, gene amplification, chromosomal translocations) • The concept of the multi-step nature of cancer development.
Chapter 3	**Chapter 3: Oncogenes: Discovery and Characterization** • Historical discoveries of key oncogenes.

	• Experimental approaches to identifying oncogenes. • Case studies of well-known oncogenes (e.g., RAS, MYC, HER2).
Chapter 4	**Chapter 4: Genetic Structure of Oncogenes** • Detailed examination of oncogene structure. • Functional domains of oncogene-encoded proteins. • Impact of structural alterations on protein function.
Chapter 5	**Chapter 5: Regulation of Oncogene Expression** • Transcriptional regulation of oncogenes. • Post-transcriptional mechanisms (e.g., miRNAs, RNA stability). • Epigenetic modifications affecting oncogene expression.
Chapter 6	**Chapter 6: Biochemical Properties of Oncogene-Encoded Proteins** • Protein structure and function • Signal transduction pathways involving oncogenes • Interaction of oncogene products with other cellular proteins
Chapter 7	**Chapter 7: Tumor Suppressor Genes and Their Roles** • Overview of tumor suppressor genes • Mechanisms of tumor suppressor gene inactivation • Case studies (e.g., TP53, RB1, BRCA1/2)
Chapter 8	**Chapter 8: Cellular Signaling Pathways in Cancer**

	• Key signaling pathways implicated in cancer (e.g., MAPK, PI3K/AKT, JAK/STAT) • Crosstalk between signaling pathways • Targeting signaling pathways in cancer therapy
Chapter 9	**Chapter 9: Oncogenes in Cell Cycle and Apoptosis Regulation** • Role of oncogenes in cell cycle progression • Oncogenes and resistance to apoptosis • Therapeutic targeting of cell cycle and apoptosis pathways
Chapter 10	**Chapter 10: Genomic and Epigenomic Instability in Cancer** • Mechanisms of genomic instability • Role of epigenetic changes in cancer • Approaches to targeting genomic and epigenomic alterations
Chapter 11	**Chapter 11: Cancer Genomics and Oncogenomics** • High-throughput genomic technologies • The Cancer Genome Atlas (TCGA) and other genomic databases • Application of oncogenomics in personalized medicine
Chapter 12	**Chapter 12: Model Systems for Studying Oncogenes** • In vitro models (cell lines, organoids) • In vivo models (transgenic mice, xenografts)

	• Advantages and limitations of different model systems
Chapter 13	**Chapter 13: Targeted Therapies and Precision Oncology** • Development of targeted cancer therapies • Mechanisms of action of targeted drugs (e.g., tyrosine kinase inhibitors, monoclonal antibodies) • Challenges and future directions in precision oncology
Chapter 14	**Chapter 14: Emerging Technologies and Future Directions** • CRISPR and gene editing in cancer research • Single-cell sequencing and its applications • Advances in cancer immunotherapy
Chapter 15	**Chapter 15: Case Studies and Current Research** • Analysis of landmark studies in cancer biology • Review of recent research articles • Future prospects and open questions in the field

26. Weekly Schedule | **26. الجدول الأسبوعي**

Week الأسبوع	Date التاريخ	Topics Covered الموضوعات المتناولة	CILOs مخرجات التعلُم للمقرر (CILOs)	Teaching/Assessment Mode and Method منهجية ونمط التدريس/التقييم
1		Chapter 1	*1, 2 and 3*	Traditional تقليدي Self-*assessment during class time*

2		Chapter 2	1, 2, 3	Traditional تقليدي
3		Chapter 3	1-4	Traditional تقليدي
4		Chapter 4	1-5	Traditional تقليدي
5		Chapter 5	1-5	Traditional تقليدي
6		Chapter 6	1-5	Traditional تقليدي
7		Chapter 7	1-5	Traditional تقليدي
8		Chapter 8	1-5	Traditional تقليدي
9		Chapter 9	1-5	Traditional تقليدي
10		Chapter 10	1-5	Traditional تقليدي
11		Chapter 11	1-5	Traditional تقليدي
12		Chapter 12	1-5	Traditional تقليدي
13		Chapter 13	1-5	Traditional تقليدي
14		Chapter 14	1-5	Traditional تقليدي
15		Chapter 15	1-5	Traditional تقليدي
16				
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.	يتعيّن على الطلبة الالتزام بأعلى مستويات الصدق والأمانة والأخلاق الأكاديمية في سعيهم لتحقيق أهدافهم الأكاديمية وفقًا للوائح سلوك الطلاب والنزاهة الأكاديمية، سياسات مكافحة الانتحال، ودليل حقوق الطلبة وواجباتهم، المعمول بها في جامعة البحرين. يمكن لعواقب الغش والسرقة الأدبية والتعاون غير المصرح به وغيرها من أشكال عدم الأمانة الأكاديمية أن تكون خطيرة للغاية وسيتم التعامل معها وفقًا للسياسات واللوائح المذكورة آنفا.
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.	يجب على الطلبة الالتزام بالحضور المنتظم للمحاضرات الصفية والعملية، حسبما تحدده طبيعة المقرر الدراسي، ووفقا للمادة (33) من نظام الدراسة والامتحانات في جامعة البحرين.