Course Syllabus
MBMB 624 Adeno -associated Viral Vectors
Academic Year 2025

Course ID and Title: MBMB 624
Adeno -associated Viral Vectors

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Credits: 1 (0-2-1)

Curriculum: Master of Science Program in Molecular and Integrative Biosciences (Elective course)
Doctor of Philosophy Program in Molecular and Integrative Biosciences (Elective course)
Master of Scienc e Program in Advanced Biomedical Technology and Venture Creation in Healthcare (Elective course)

Semester: First and Second Semesters

Pre -Requisites: None

Course learning outcomes (CLOs) and their alignment with PLOs:

By the end of the course, students should be able to:	PLO1	PLO2	PLO3	PLO4
1. Describe the basic biology of AAV vectors, the different types of AAV, and the advantages and disadvantages of using AAV vectors for gene therapy	✔			
2. Develop conceptual and work skills through hands-on experience in designing and producing recombinant AAV		✔		
3. Comply with professional ethics and integrity, responsibility, and safety practices			✔	

4. Demonstrate professional and interpersonal skills				✔

Course Description:

Adeno-associated viral vector overview, Upstream bioprocessing of adeno-associated viral vector, Downstream bioprocessing of adeno-associated viral vector, Vector characterization and Quality control, Working safely with adeno-associated viral vector

Alignment of Teaching and Assessment Methods to Course Learning Outcomes:

Course Learning Outcomes	Teaching Method	Assessment Method
1. Describe the basic biology of AAV vectors, the different types of AAV, and the advantages and disadvantages of using AAV vectors for gene therapy	1. Lecture 2. Discussion	1. Q&A 2. Discussion
2. Develop conceptual and work skills through hands-on experience in design and produce recombinant AAV	1. Discussion 2. Hands-on lab practice 3. Individual or group assignment/presentation	1. Lab performance 2. Lab report 3. Discussion
3. Comply with professional ethics and integrity, responsibility, and safety practices	1. Hands-on lab safety practice	1. Presentation 2. Lab report
4. Demonstrate professional and interpersonal skills	1. Discussion 2. Problem-based learning	1. Presentation

Course Schedule, learning activity , and assessment:

	Activities	Description	Assessment methods	Scores	Time
Day 1					
1	**Active discussion**	Adeno-associated viral vector overview	1. Discussion 2. Quiz	10%	9:00 - 10:00
2	**Active discussion**	Working safely with adeno-associated viral vector	1. Discussion 2. Quiz	5%	10:00 – 11:00

3	**Active discussion**	Upstream bioprocessing of adeno -associated viral vector	1. Discussion 2. Quiz	10%	11:00 - 12.00
4	**Active discussion**	Downstream bioprocessing of adeno - associated viral vector	1. Discussion 2. Quiz	10%	13.00 - 14.30
5	**Active discussion**	Recombinant adeno - associated virus characterization and quality control	1. Discussion 2. Quiz	10%	14:30 - 15:30
6	**Active discussion**	Q&A			15:30 – 16:00
Day 2					
1	**Laboratory**	Laboratory session on "Upstream bioprocessing of rAAV" Techniques to learn: - Molecular cloning - Plasmid preparation - rAAV production	1. Lab performance 2. Discussion	15%	9:00 – 16:00
Day 3					
1	**Laboratory**	Laboratory session on "Downstream bioprocessing of rAAV" Techniques to learn: - rAAV particle extraction - rAAV particle collection and purification	1. Lab performance 2. Discussion	15%	9:00 – 16:00
Day 4					
1	**Laboratory**	Laboratory session on "Downstream bioprocessing of rAAV" Techniques to learn: - rAAV particle extraction - rAAV particle collection and purification	1. Lab performance 2. Discussion	15%	9:00 – 16:00

Day 5					
1	**Laboratory**	Laboratory session on "rAAV analytics and transduction" Techniques to learn: - rAAV titration - rAAV transduction *in vitro*	1. Lab performance 2. Discussion	10%	9:00 – 12:00
2	**Student's Reflection**	To provide students opportunities to describe their learning experiences received from this course and how it can be applied to their future learning.	-	-	13:00 – 15:00
3	**After Action Review**	To collect comments, suggestions from students for further improvements of the course.	-	-	15:00 – 16:00

Note: Some changes might be applied as appropriate.

Assessment Criteria:

Assessment method	**Performance criteria**	**Scoring rubric**
Participation (10%)	Engagement level of learner **(10%)**	Active engage (4) Fairly active (2 -3) Inactive (1)
Quiz (10%)	Correctness level **(10%)**	Raw scores will be adjusted to be in a range of % indicated above
Discussion (20%)	Participation **(5%)**	Active (4) Fairly active (2 -3) Inactive (1)
	Interpersonal and interpersonal skills **(5%)**	Excellent (4) Good (3) Fair (2) Underperform (1)
	Demonstrate critical and high - order thinking skills **(10%)**	Excellent (4) Good (3) Fair (2) Underperform (1)
Lab performance (40 %)	Safety practice **(5%)**	Excellent (4) Good (3)

Assessment method	Performance criteria	Scoring rubric
		Fair (2) Underperform (1)
	Lab skills **(15%)**	Excellent (4) Good (3) Fair (2) Underperform (1)
	Responsibility **(5%)**	Excellent (4) Good (3) Fair (2) Underperform (1)
	Troubleshooting skills **(5%)**	Excellent (4) Good (3) Fair (2) Underperform (1)
Lab report (20%)	Report organization: intro, methods, results, discussion , and conclusion **(5%)**	Excellent (4) Good (3) Fair (2) Underperform (1)
	Data presentation, analysis , and interpretation **(10%)**	Excellent (4) Good (3) Fair (2) Underperform (1)
	Readability of the report **(5%)**	Excellent (4) Good (3) Fair (2) Underperform (1)

Student's achievement will be graded using symbols: A, B+, B, C+, C, D+, D and F, based on the criteria as follows:

Percentage	Grade	Description
80 – 100	A	Excellent
75 – 79	B+	Very Good
70 – 74	B	Good
65 – 69	C+	Fairly Good
60 – 64	C	Fair
55 – 59	D+	Poor
50 – 54	D	Very Poor
0 – 49	F	Fail

Date of Revision: November 2025