

BIOLOGY 362 (CRN 20361)
TECHNIQUES IN MOLECULAR BIOLOGY
January – April 2018
COURSE OUTLINE

LECTURER:

RÉAL ROY, Ph.D.

Office: Cun048

Phone: 472-5071

email: realroy@uvic.ca

JOHN TAYLOR, PhD.

Office: Petch 012

Phone: 472-5206

email: taylorjs@uvic.ca

Lectures: Elliott 162 Wednesday: 13:30-14:20

LAB INSTRUCTORS:

Lan Tran, PhD. candidate

Lab Coordinator and Instructor

email: lttran@uvic.ca

Chloe Christensen, PhD. candidate

Lab Instructor

email: chloechr@uvic.ca

Laboratory: **Cunningham 132**

Lab section 01 THursday: 14:30-17:30

Lab section 02 FRiday: 13:30-16:30

COURSE DESCRIPTION. An introduction to basic techniques in molecular biology. Lectures will cover theoretical aspects of DNA structure and function and its use in ecology and evolution. Laboratory will cover: nucleic acid (DNA) extractions (bacteria, fish); Polymerase Chain Reaction (PCR); molecular cloning; gel electrophoresis; DNA sequencing; colony hybridization; computer based analyses of nucleotide and protein sequences (BLAST, phylogenetic analyses). Students will undertake assignments on WHMIS, BioSafety and Radiation Safety, on PCR primer design, and on BLAST analysis. At the end of this course the student will be able to perform various standard techniques in molecular biology to address questions in molecular biology, microbial ecology or population genetics.

Evaluation

1. Laboratory Report (Total 30%)
 Lab Notebook (3%)
 Report (27%)
3. MID-TERM EXAM: (30% of Final Grade)
4. FINAL EXAM: In Final Exam Period (40% of Final Grade)

Remarks:

1) Lab report will follow the style of a scientific article: Abstract, Introduction, Material and Methods, Results, Discussion, References. For bibliographic references, students should follow the format outlined in the lab manual.

2) If you are sick for an evaluation or a lab you will need to bring a medical note (original and dated) to justify your absence.

Grading scheme:

A+ (90-100%), A (85-89.9%), A- (80-84.9%), B+ (77-79.9%), B (73-76.9 %), B- (70-72.9%), C+ (65-69.9%), C (60-64.9%), D (50-59.9%), F (<50%, after final)

LABORATORIES

Date	Lecture	Topic	Lab
Jan. 3	1	Introduction: WHMIS, Biosafety, General lab procedures, Lab notebooks	1
Jan. 10	2	Nucleic acids extraction	2
Jan. 17	3	Polymerase Chain Reaction	3
Jan. 24	4	PCR; Gel electrophoresis and PCR purification	4
Jan. 31	5	Cloning of bacterial DNA and plasmid transformation	5
Feb. 7	6	Midterm Exam / Colony PCR and DNA sequencing	6
Feb. 14	Break	No Lecture / No Lab	
Feb. 21	7	Agarose Gel; Miniprep; Restriction Digest	7
Feb. 28	8	Colony hybridization (Part I) / Agarose gel electrophoresis	8
Mar. 8	9	Colony hybridization (Part II)	9
Mar. 14	10	Bioinformatics (Part I)	10
Mar. 21	11	Bioinformatics (Part II)	11
Mar. 28	12	Good Friday	
April	Final		

Recommended reading:

Textbooks:

Custom Pearson Textbook BIOL 362 Techniques in Molecular Biology.

Boyer, R. 2012. Biochemistry Laboratory.

Roy, R. 2016. BIOL 362 Techniques in Molecular Biology. Coursepack Spring 2017.

Lab Manual

Curry, K., R. Roy, J.S. Taylor. 2018. Biology 362 Techniques in Molecular Biology. Laboratory Manual.

References

- Watson, J.D., T.A. Baker, S.P. Bell, A. Gann, M. Levine, R. Losick. 2014. *Molecular Biology of the Gene*. 7th edition. Benjamin Cummings.
- Boyer, R. 2012. *Biochemistry Laboratory. Modern Theory and Techniques*. 2nd edition. Prentice-Hall, Upper Saddle River, NJ, USA.
- Gerhardt, P., R.G.E. Murray, W.A. Wood, N.R. Krieg. 1994. *Methods for General and Molecular Bacteriology*. American Society of Microbiology (ASM), Wash., DC.
- Lodish, H. A. Berk, P. Matsudaira, C.A. Kaiser, M. Krieger, M.P. Scott, S.L. Zipurski, and J. Darnell. 2004. *Molecular Cell Biology*. W.H. Freeman & Co., New York, NY.
- Sambrook, J., and D.W. Russell. 2001. *Molecular Cloning. A Laboratory Manual*. CSHL Press, Cold Spring Harbour, NY.
- Weaver, R.W. 1994. *Methods of Soil Analysis. Part 2 Microbiological and Biochemical Properties*. Soil Science Society of America (SSSA), Madison, WI.
- Young, P.G. 2003. *Exploring Genomes*. WH Freeman, New York, NY.

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