

Work Plan

I. IDENTIFICATION			
Course:	GRADUATE PROGRAM IN BIOLOGICAL SCIENCES		
Discipline:	Methods in Cell and Tissue Biology		
Professor:	Ellen Leonel		
Other professors:			
Semester:	2026.1		
Theoretical workload:	12h	Practical workload:	48h
Language of the discipline	<input type="checkbox"/> Portuguese	<input checked="" type="checkbox"/> English	<input type="checkbox"/> Spanish
	Obs:		
Modalities of the discipline	<input type="checkbox"/> Virtual	<input type="checkbox"/> Presential	<input checked="" type="checkbox"/> Virtual and Presential
	<input checked="" type="checkbox"/> Synchronous	<input type="checkbox"/> Assynchronous	<input type="checkbox"/> Synchronous and Assynchronous
II. SUMMARY			
Introduction to methodology for cell and tissue studies. Cytochemistry principles. Principles of photonic microscopy. Preparation of solutions, stains, and fixatives. Methods of collecting and fixation of biological samples. Methods of impregnation, and paraplast and plastic resin embedding. Microtomy. Cytochemistry methods. Methods in immunohistochemistry. Obtaining, analysis and interpretation of photomicrographs. Morphometrical and stereological analysis.			
III. GENERAL AIM			
<i>By the end of the course, the student must be able to understand the theoretical and practical principles underlying the main methods used in cell and tissue biology (histological processing, cytochemistry, immunohistochemistry), as well as apply these concepts in scientific research.</i>			
IV. SPECIFIC AIMS			
<ol style="list-style-type: none"> 1) Learning the basic principles related to the processing of biological samples 2) Learning the basic principles of cytochemical reactions 3) Learning the theoretical and practical principles of immunohistochemistry 4) Learning the theoretical and practical principles of immunofluorescence 5) Learning the basic principles on morphology, morphometry and stereology 6) Debating about the applicability of histological techniques in basic and applied science 			
V. CONTENT			
<ol style="list-style-type: none"> 1) Histological processing 2) Cytochemistry reactions 3) Immunohistochemistry 4) Immunofluorescence 5) Morphometry 6) Stereology 7) Basic notions of statistics applied to scientific research 8) Applicability of histological techniques in basic and applied science 			
VI. METHODOLOGY			
Practical classes will be delivered exclusively in person. Theoretical classes conducted virtually will take place via Google Meet, using a link that will be provided in advance. Practical classes will be held at the Microscopy Laboratory Applied to Reproduction (LaMARE), ICB 3, first floor.			
VII. PROCESSES AND CRITERIA OF EVALUATION AND EVALUATION'S TIMELINE			

The student's evaluation will be based on three aspects:

1. The quality of the answers provided to randomly assigned questions during the theoretical classes (each student will answer one question during the online session)
2. Student participation during the practical classes
3. The quality of the scientific report presentation related to the content studied in the course.

G1 = answers provided to randomly assigned questions during the theoretical classes (10,0)

G2 = participation during the classes (theoretical and practical) (10,0)

G3 = Final report** (10,0)

Final grade = $(G1 \times 0,2) + (G2 \times 0,3) + (G3 \times 0,5)$

** The final report will be based on the results produced by each student from the biological samples, and all the methodologies applied during the course. The topics to be presented are provided in the topic VIII. The presentations must contain: Introduction, Material and Methods; Results and Discussion; References. Keep in mind that all presentations will be held in English.

Every two students (group) must share the same biological sample. In case the student does not have a biological sample, the professor will provide it, allowing the student to participate of the discipline.

VIII. TIMELINE *

Date	Content/Activity	References
18/05/26	Theoretical class: Presentation of the discipline/work plan Methods in cell and tissue biology, Microscopy, morphometry, and photodocumentation Morning: 08:30 am to 12:00 pm	Work plan; Ref. 1 to Ref. 4
19/05/26	Theoretical class: Immunohistochemistry and immunofluorescence Morning: 08:30 am to 12:00 pm	Ref. 1 to Ref. 4, and practical classes
25/05/26	Practical class: Collecting and processing of biological samples Morning: 08:00 am to 12:00 pm – Afternoon: 14:00 pm to 18:00 pm	Ref. 1 to Ref. 4, and practical classes
26/05/26	Practical class: Microtomy Morning: 08:00 am to 12:00 pm – Afternoon: 14:00 pm to 18:00 pm	Ref. 1 to Ref. 9, and practical classes
27/05/26	Practical class: Cytochemistry Morning: 08:00 am to 12:00 pm – Afternoon: 14:00 pm to 18:00 pm	Ref. 1 to Ref. 4, and practical classes
28 and 29/05/26	Practical class: Photodocumentation Morning: 08:00 am to 12:00 pm – Afternoon: 14:00 pm to 18:00 pm	Ref. 1 to Ref. 9, and practical classes
28 and 29/05/26	Practical class: Immunohistochemistry and immunofluorescence Morning: 08:00 am to 12:00 pm Afternoon: 14:00 pm to 18:00 pm	Ref. 1 to Ref. 4, and practical classes
03/06/26	Theoretical class: Presentation of the scientific reports (Final reports) Morning: 08:30 am to 12:00 pm	Ref. 1 to Ref. 9, and practical classes
04/06/26	Closing of the discipline and grade releasing	---

* The timeline is subjected to changes by the professor if necessary.

IX. REFERENCES

1) Basic

Ref. 1 - Ribeiro, Ciro Alberto de Oliveira; Reis Filho, Herculano Salviano; Grötzner, Sonia Regina. Técnicas e métodos para utilização prática em microscopia. 1ª ed., Santos Editora, Santos, São Paulo, 2012.

Ref. 2 - Carvalho, Hernandes Faustino; Recco-Pimentel, Shirlei Maria. A célula. 3ª ed., Editora Manole Ltda, Barueri, São Paulo, 2013.

2) Complementary

Ref. 3 - Carneiro, José; Junqueira, Luiz Carlos Uchoa. Histologia básica. 12ª ed., Editora Guanabara Koogan, Rio de Janeiro, 2017.

Ref. 4 - Ross, Michael H; Pawlina, Wojciech. Histologia - texto e atlas: em correlação com Biologia Celular e Molecular. 7ª ed., Editora Guanabara Koogan, Rio de Janeiro, 2016.

Ref. 5 - S.R. Taboga, A.B. Santos, A.G.R. Gonzatti, B.C. Vidal, M.L. Mello. Nuclear phenotypes and morphometry of human secretory prostate cells: a comparative study of benign and malignant lesions in Brazilian patients. *Caryologia* 3 (2003) 15-322.

Ref. 6 - L.A. Manso, B.C.M. Medeiros, G.A. Rodrigues, J.G. Ramos, M.R. Marques, S.R. Taboga, F.C.A. Santos, M.F. Biancardi. Testosterone exposure in prenatal life disrupts epithelial nuclear morphology, smooth muscle layer pattern, and FGF10 and Shh expression in prostate. *Life Sciences* 2021, Online ahead of print.

Ref. 7 - L.J. Gomes, G.A. Rodrigues, B.C.M. Medeiros, L.A. Manso, J.G. Ramos, P.V. de Azevedo Brito, S.R. Taboga, H.F. de Carvalho, F.C.A. dos Santos, M.F. Biancardi. The influence of pregnancy on female prostate morphophysiology in gerbils (*Meriones unguiculatus*). *Reproductive Sciences* 2021, Online ahead of print.

Ref. 8 - R.W. Veltri, C.S. Christudass, S. Isharwal. Nuclear morphometry, nucleomics and prostate cancer progression. *Asian J. Androl.* 14 (2012) 375-384.

Ref. 9 – Moore, David S. A estatística básica e sua prática. 5ª ed., Editora LTC, Rio de Janeiro, 2011.

X. PLACE OF RESULTS RELEASING

The final grade will be released through the SIGAA.

XI. OBSERVATIONS

Not applicable.