

OCSC 4921 – Reproductive Strategies of Marine Animals Winter 2023

Description – *Reproductive Strategies of Marine Animals* explores the principles and tactics of reproduction in an evolutionary ecology context, with an emphasis on adaptations to the marine environment. It focuses on the behavioural, ecological and life-history means by which marine animals maximize their lifetime reproductive success. The course covers such topics as sex determination, hermaphroditism, sex ratio, reproductive allocation, mating systems, sexual selection, sexual dimorphism, and parental investment. Various reproductive strategies are exemplified in the major groups of marine animals.

Pre-requisites: OCSC 1000, Biology 2600 and 2900

Lectures: Three hours per week: Monday and Wednesday, 5:30 – 6:45 pm, C 3053

Instructor: Ian Fleming, Professor, Department of Ocean Sciences
Ocean Sciences Centre, Room AX-4022A
Phone: 709-864-3586; Email: ifleming@mun.ca

Office hours: By appointment – email me (ifleming@mun.ca) to set up an appointment. Please use the subject line “OCSC 4921.” I will typically respond within 24 hours. Meetings can be in person at my office or virtually by WebEx or Skype.

Course Material: There is no required textbook for the course. Reading assignments will include chapters from books and the primary literature posted on Brightspace (i.e. D2L).

Tentative Course Schedule

Week 1 (Jan 9, 11)

- Course Overview: Introduction to Reproductive Strategies
- Optimality and frequency dependence, Evolution of Sex
- Gamete size: isogamy versus anisogamy in marine animals
- Sex Determination

Week 2 (Jan 16, 18)

- Hermaphroditism
- Sex ratio

Week 3 (Jan 23, 25)

- Age at maturity, fisheries induced evolution
- Semelparity vs iteroparity & reproductive effort in marine animals

Week 4 (Jan 30, Feb 1)

Reproductive effort (cont.)

Classifying mating systems in marine animals

Sexual selection & mate choice in marine animals

Week 5 (Feb 6, 8)

Mate choice (cont.)

Signals acoustic, chemical & colour

Week 6 (Feb 13, 15)

Exam: Mid-term examination (Feb 13)

Sexual size dimorphism & weapons in marine animals

Week 7 (Feb 20, 22)

Mid-semester Break

Week 8 (Feb 27, Mar 1)

Sexual dimorphism & weapons (cont.)

Postcopulatory sexual selection (sperm competition & selection) in aquatic environments, fertilization

Week 9 (Mar 6, 8)

Alternative reproductive strategies and tactics

Diversity of parental care in marine animals

Week 10 (Mar 13, 15)

Parental care (cont.)

Intra-familial Conflict

Week 11 (Mar 20, 22)

Intra-familial Conflict (cont.)

Non-genetic parental (maternal & paternal) effects

Week 12 (Mar 27, 29)

Student presentations

Student presentations

Week 13 (Apr 3, 5)

Parental effects (cont.)

Case study: Human impacts on sea bird breeding

Case study: Reproductive success and effects of escapes from net-pen aquaculture on wild fish populations

TBD: Final Examination

Evaluation

Assignments – Thought problems (1-2 pages, double spaced; 3 x 5% each; assigned weeks 2, 4, 9; due **Jan 23, Feb 6, Mar 13**) – 15%

Mid-term exam (Feb 13) – will involve long answer questions – 25%

Term paper (5-6 pages, double-spaced; due **Mar 22**) – student's choice of topic related to reproductive strategies, whether it be related to a specific group of organisms (case study) or topical issue (I will need to know your choice of topic by **Mar 8**). – 15%

Oral presentation (week 12) – Each student will give a 12-15 minute presentation based on the topic chosen for their term paper. Content and presentation skills will be evaluated. – 10%

Participation – students will be expected to participate in discussions during class, which will often centre on assigned readings – 5%

Final exam (TBD) – will involve long answer questions – 30%

Late submissions penalized (loss of 10% of value per day)

Class policies: Lectures start promptly at 5:30 pm. As you expect me to be there on time to start the lecture, I also expect you to be ready at 5:30 pm. Lectures finish at 6.45 pm. Typically, given the length of the lecture, we will take a brief break to refresh midway through. Remember you are attending lectures to take notes and attempt to learn material, not to be distract by other things.

All efforts will be made to provide a safe learning environment regardless of race, colour, nationality, ethnic origin, social origin, religious creed, religion, age, disability, disfigurement, sex (including pregnancy), sexual orientation, gender identity, gender expression, marital status, family status, source of income or political opinion.

Academic integrity: Students are expected to adhere to those principles which constitute proper academic conduct. A student has the responsibility to know which actions, as described under Academic Offences in the University Regulations, could be construed as dishonest or improper. Students found guilty of an academic offence may be subject to a number of penalties commensurate with the offence including reprimand, reduction of grade, probation, suspension or expulsion from the University. For more information regarding this policy, students should refer to the University Regulations for Academic Misconduct (Section 6.12) in the University Calendar.

Inclusion: Memorial University of Newfoundland is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the

Accommodations for Students with Disabilities

(www.mun.ca/policy/site/policy.php?id=239). Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre at the earliest opportunity (www.mun.ca/blundon).

Additional supports: Memorial offers a broad range of supports to students, which can be found at www.mun.ca/currentstudents/student and <https://munsu.ca/resource-centres/>. Academic supports include: *Memorial in Teaching University Libraries, The Commons (QEII Library), The Glenn Roy Blundon Centre, The Writing for Innovation and Learning, Information Technology Services, Academic Advising, and Centre.* Student life supports that can be availed of include: *Student Wellness and Counselling Centre, Student Support and Crisis Management, MUN Chaplaincy, Sexual Harassment Office, The Circle: First Nations, Inuit & Métis Students Resource Centre, Disability Information Support Centre, International Students Resource Centre, Sexuality and Gender Advocacy, Student Parent Assistance & Resource Centre, Students Older Than Average, Intersections – A Resource Centre for Marginalized Genders, and specific departmental societies.*

Appendix – Assignments, Term Paper & Oral presentation

1. Assignments – Thought problems (1-2 pages, double spaced)

Provide an answer to the proposed thought problem, supported by a conceptual understanding of the issue at hand.

Well-reasoned and -organized argument for your answer; clear and concise

Quality of your writing (e.g. grammar, spelling, sentence structure, organization, etc.) will also be evaluated.

Ensure your name is on your assignment.

2. Term Paper (5-6 pages, double spaced, excluding title page, references and any tables/figures)

Title page: Should include:

- Title of the paper, which should briefly (aim for 10 words or less) and clearly identify the focus of the paper.
- Author's name and affiliation
- Date submitted

Introduction: The Introduction explains the focus of the paper.

Main Body: This should present the details of the discussion of the topic of the paper. It is advisable to use subheadings to structure the flow of the paper.

Conclusion: This is usually a single paragraph that sum up the key points of the paper.

Tables & Figures: Should you include any Tables and Figures in your paper, they should be numbered consecutively and labeled with a descriptive caption (the caption appears above a Table and under a Figure). They can be included in the text where appropriate or at the end of the paper after the references (Tables followed by Figures). Be sure to refer to all Tables and Figures in the text of your paper.

Note: Be careful to avoid the many forms of plagiarism (you may not always realize you are doing it). A guide can be found at www.mun.ca/writingcentre/plagiarism/

3. Rubric for grading term paper

Title page (___/5)

Complete

Introduction (___/10)

Clear explanation of the focus of the paper, including relevant background information
Relevance of the topic well explained

Main Body (___/60)

Comprehensive discussion of topic
Statements appropriately supported by citations
Good flow and well organized
Appropriate use of subheadings
Use of tables/figures if appropriate

References (___/15)

Completeness – citations/references complete and clear
Style/format – consistent
Number/nature of references appropriate

Spelling and grammar (___/10)

Typos and/or grammatical errors

Total ___/100

4. Oral Presentation (12-15 minutes)

Content: Is the coverage of the material sufficient and is there a logical flow to the content presented?

- Relate topic clearly to audience
- Remain on topic
- Include sufficient information, scientific evidence
- Use authoritative, credible evidence (mainly primary literature)
- Clearly cite sources for data shown and assertions made

Organization: Are the different elements of the presentation clearly organized. Are presentation aid(s) used in an appropriate and efficient manner (e.g. are the slides overcrowded, the font size too small, do you position yourself so that the project image is visible to all)?

- Introduction – secure audience attention; clearly establish purpose/topic for presentation
- Body – clearly organized, logical flow; use transitions between points
- Conclusion – offers a summary of topic/ideas; provides closure
- Question period – answers questions effectively and accurately

Delivery: Is the audience engaged? Are you speaking too quickly, are you projecting your voice, are you looking at the audience or the projector/screen, do you speak in full

sentences and in a coherent fashion or do you wander from topic to topic? Do you finish your talk within the allotted time?

- Effectively use vocal variety in rate and intensity to maintain audience interest
 - Use appropriate pronunciation, articulation, grammar
 - Use language that is appropriate to the scientific topic and audience
 - Use of physical mannerisms that support the message (including appropriate eye contact, facial expressions, gestures)
 - Adhere to time limitations (using allotted time effectively)
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5. Rubric for grading the oral presentation

Content – Coverage

Topic was well mastered and covered adequately (good balance between breadth and in depth).

15 13 11 9 7 5 3 1

Content – Support

Arguments and figures were clearly presented and were properly supported (citing sources, credit).

10 8 6 4 2

Content – Logical flow

Presentation flowed smoothly, with logical links between major themes/segments.

10 8 6 4 2

Organization – Introduction / conclusion

Presentation included a clear introduction and a clear conclusion.

10 8 6 4 2

Organization – Structure

Major segments/themes of the presentation were appropriately separated to optimize clarity. Each was devoted an adequate amount of slides/time.

15 13 11 9 7 5 3 1

Organization – Layout / design of visual aids

Slides were not cluttered and font size was appropriate, easy to read. Text and images were balanced and adequate to explain/present the material.

10 8 6 4 2

Delivery – Clarity

The presentation was enjoyable / entertaining (good pace, voice projection, pronunciation, eye contact).

10 8 6 4 2

Delivery – Time

Made effective use of time (not too short), without going over (not too long).

10 8 6 4 2

Delivery – Question period

Clear/concise responses were provided, demonstrating a good understanding of topic.

10 8 6 4 2

Total _____ /100 (worth 20%)