



### C3. PHYSIOLOGICAL ECOLOGY OF MARINE ORGANISMS

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#### Course outline-lectures

##### 1) Principles of marine ecophysiology

- The life in the water.
- Dissolved oxygen and CO<sub>2</sub> and physiology of marine organisms
- Energy demand and growth-Bioenergetics

##### 2) Ecophysiology of marine organisms in the 21th century

- Why ecophysiology is so important?
- Understating the correlation between habitat and physiological traits

##### 3) Environmental stress and physiological adaptability

- Stress physiology of marine organisms
- The role of ecophysiology in detecting vulnerabilities to environmental change
- Pollution and physiological responses of marine organisms
- Physiological responses to simultaneous shifts in multiple environmental stressors: Relevance in a changing world

##### 4) Fundamentals of physiological ecology related to climate change

- Climate change drivers and environmental stress
- Global warming and physiological responses of marine organisms
- Ocean acidification and physiological responses of marine organisms

##### 5) Ecophysiology, Management and Policy

- From the physiology to coastal areas
- The role of ecophysiology in biomonitoring programs
- Contribution of physiological ecology to risk assessment
- The role of physiological processes in the management of farmed organisms

#### Readings

Hochachka P. W. and Somero G. N. (eds) (2002). Biochemical Adaptation: Mechanism and process in physiological evolution. Oxford University Press

Bayne L. B. (ed) (2009). Marine mussels: their ecology and physiology. Cambridge University Press.

Lars Tomanek and Brian Helmuth (2002). Physiological Ecology of Rocky Intertidal Organisms: A Synergy of Concepts. Integr. Comp. Biol42 (4): 771-775.



Hans-O. Pörtner (2012). Integrating climate-related stressor effects on marine organisms: unifying principles linking molecule to ecosystem-level changes. *Mar Ecol Prog Ser*, Vol. 470: 273–290.

Pörtner HO, Farrell AP (2008). Physiology and climate change. *Science* 322: 690–692.

Sokolova Inna M. and Lannig Gisela (2008). Interactive effects of metal pollution and temperature on metabolism in aquatic ectotherms: implications of global climate change. *Climate Research*, Volume: 37, Issue: 2-3, Pages: 181-201.

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Elizabeth P. Dahlhoff (2004). Biochemical Indicators of Stress and Metabolism: Applications for Marine Ecological Studies. *Annual Review of Physiology*, Vol. 66: 183-207.

Helmuth Brian (2009). From cells to coastlines: how can we use physiology to forecast the impacts of climate change? *Journal of experimental biology* Volume: 212, Issue: 6, Pages: 753-760.