



THE SCHOOL  
FOR FIELD STUDIES



# Rescue and Rehabilitation: Marine Animals

## SFS 3754

**Syllabus**  
**4 credits**

The School for Field Studies (SFS) & Blue World Institute (BWI)  
Center for the Conservation of Marine Megafauna  
Veli Lošinj, Lošinj Island, Croatia

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.

[www.fieldstudies.org](http://www.fieldstudies.org)

© 2024 The School for Field Studies



## COURSE CONTENT SUBJECT TO CHANGE

***Please note that this is a copy of a recent syllabus. A final syllabus will be provided to students on the first day of academic programming.***

SFS programs are different from other travel or study abroad programs. Each iteration of a program is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- Changes in access to or expiration or change in terms of permits to the highly regulated and sensitive environments in which we work;
- Changes in social/political conditions or tenuous weather situations/natural disasters may require changes to sites or plans, often with little notice;
- Some aspects of programs depend on the current faculty team as well as the goodwill and generosity of individuals, communities, and institutions which lend support.

Please be advised that these or other variables may require changes before or during the program. Part of the SFS experience is adapting to changing conditions and overcoming the obstacles that may present. In other words, the elephants are not always where we want them to be, so be flexible!

---

## Course Overview

---

Monitoring stranded and deceased marine megafauna often provides unique opportunities to study many aspects of their biology and life histories that would otherwise be unknown. Health, such as diseases and parasites, environmental stressors, and anthropogenic threats are just some topics that can be informed. Data can provide vital insights into wild populations and their status, providing crucial and relevant information for their management and conservation. Postmortem analysis can provide information on causes of death and any samples collected provide the opportunity to obtain information on biology and ecology of the populations.

Countries apply different protocols and have different forms of networks that tend to the needs of injured animals and/or collect stranded and dead individuals for postmortem analysis. Members of these networks are often natural history museums, academic organizations and specialist NGOs that collect and preserve long-term datasets and samples providing opportunities for systematic investigations into changes in the environment and population statuses. Many of the members of these networks cannot respond to all the reported stranding hence informing and training individuals, that can carry out either basic sampling postmortem or take basic care of the animal while rescue services arrive, is a great asset.

The correct care of the stranded animals can greatly improve the chance of full recovery, minimize stress, and improve animal welfare. Cetaceans and sea turtles are endangered and protected animals, hence rescuing and saving every single animal may have an impact on the population. Therefore, involving students with hands-on opportunities to care for these animals may provide a vital link that young people need to be able to understand the impacts and consequences of their daily actions and decisions.

The goal of this course is to provide students with in-depth knowledge and practical, applicative skills in the conservation of marine megafauna. This course will cover relevant parts of sea turtle and cetacean natural history and biology (anatomy & morphology), that relate to providing an understanding of the husbandry, nutrition, diagnostics, therapeutics, surgery, emerging diseases, trauma, and mortality events. The course includes an overview of the most common anthropogenic threats in marine environment and state of the art solutions, while also providing knowledge on animal conditions that require treatment and recommendations for designing an effective and feasible treatment plan.

## Learning Objectives

---

1. Knowledge and understanding:
  - a. Be able to identify distinct species of marine mammals and sea turtles.
  - b. Identify and be familiarized with the main anatomical and morphological features and adaptations of cetaceans and sea turtles.
  - c. Understand diagnostic techniques and necropsy procedures.
  - d. Understand safety protocols for live animal rescue and post-mortem analysis (incl. injuries and zoonotic diseases).
  - e. Understand main threats (inc. fisheries, noise, and pollution) to cetaceans and sea turtles in the marine environment.
2. Reflection:
  - a. Able to critically discuss impact of anthropogenic threats to cetaceans and sea turtles.
  - b. Able to carry out basic sampling during postmortem on sea turtles and cetaceans.
  - c. Able to apply animal welfare and safety when designing and carrying out different rescue and rehabilitation procedures.

3. Application:
  - a. Participation in different animal husbandry and post-mortem analysis.
  - b. Collection of samples for further analysis in a standardized manner enabling long-term storage, future use, and sample exchange.
  - c. Organization of basic animal rescue and stranding management on-site prior to rescue team arrival or animal transport to rescue center.
  - d. Critical examination of stranding and postmortem data for the causes of death and determine the applicability of this data with regards to species conservation strategies.

## Assessment

---

The evaluation breakdown for the course is as follows:

Assessment Item	Value (%)
Participation	10
Quiz	15
Individual Topic Essay	20
Group Presentation	25
Field Exercises	30
<b>TOTAL</b>	<b>100</b>

### Participation (10%)

Students should be prepared for each academic session. This implies reading the materials for each session with enough detail to be able to ask relevant questions; and to participate in analytical discussions about the key issues. Active participation during lectures, discussions, field lectures and lab exercises is expected.

### Quiz (15%)

This short quiz will test how well students have adopted general knowledge on anatomy, morphology, necropsy, and sampling. The quiz will consist of multiple-choice questions.

### Individual Topic Essay (20%)

The assignment will showcase how well students have adopted general knowledge on threats to sea turtles and cetaceans. Students will be required to research a topic related to the threat of their own choice (covered during lectures and practicals), write an essay, make the presentation to the classroom, and then lead a short, focused discussion related to the presentation topic.

### Group Presentation (25%)

The third assignment will be in the format of a group presentation, asking students to explore in groups additional general and specialty topics related to cetacean and sea turtle care and handling. Groups will be asked to make a presentation to the classroom and then lead a short, focused discussions related to the presentation topic.

### Field Exercises (30%)

Students will be assessed based on their participation and application of various techniques over the multiple cetacean and sea turtle care and handling sessions.

## Grading Scheme

---

A	95.00 - 100.00%	B+	86.00 - 89.99%	C+	76.00 - 79.99%	D	60.00 - 69.99%
A-	90.00 - 94.99%	B	83.00 - 85.99%	C	73.00 - 75.99%	F	0.00 - 59.99%
		B-	80.00 - 82.99%	C-	70.00 - 72.99%		

## General Reminders

---

**Honor Code/Plagiarism** – SFS places high expectations on their students and we hold students accountable for their behaviors. SFS students are held to the honor code below. SFS has a zero-tolerance policy towards student cheating, plagiarism, data falsification, and any other form of dishonest academic and/or research practice or behavior. Using the ideas or material of others without giving due credit is cheating and will not be tolerated. Any SFS student found to have engaged in or facilitated academic and/or research dishonesty will receive no credit (0%) for that activity.

*“SFS does not tolerate cheating or plagiarism in any form. While participating in an SFS program, students are expected to refrain from cheating, plagiarism and any other behavior which would result in a student receiving credit for work which they did not accomplish on their own. Students are expected to report any instance of cheating or plagiarism by others.”*

**Deadlines** – Deadlines for written and oral assignments are instated to promote equity among students and to allow faculty ample time to review and return assignments before others are due. As such, deadlines are firm; extensions will only be considered under extreme circumstances. Late assignments will incur a penalty of 10% of your grade for each day you are late. After two days past the deadline, assignments will no longer be accepted. Assignments will be handed back to students after a one-week grading period. Grade corrections for any assessment item should be requested in writing at least 24 hours after assignments are returned. No corrections will be considered afterwards.

**Content Statement** – Every student comes to SFS with unique life experiences, which contribute to the way various information is processed. Some of the content in this course may be intellectually or emotionally challenging but has been intentionally selected to achieve certain learning goals and/or showcase the complexity of many modern issues. If you anticipate a challenge engaging with a certain topic or find that you are struggling with certain discussions, we encourage you to talk about it with faculty, friends, family, the HWM, or access available mental health resources.

**Participation** – Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for lost time. Participation in all components of the course is mandatory, it is important that you are prompt for all activities, bring the necessary equipment for field exercises and class activities, and simply get involved.

## Course Content

**Type:** L: Lecture, O: Orientation; P: Practical work, FEX: Field Experience

No	Title and outline	Type	Time (hrs)	Required Readings
1	Course Introduction	O	1.0	
<b>Anatomy, morphology, necropsy and sampling</b>				
2	Sea turtle morphology, anatomy & necropsy techniques	L	2.0	Wyneken (2002).
3	Cetacean morphology, anatomy & necropsy techniques	L	2.0	IJsseldijk, et al. (2019).
4	Sea turtle species identification	P	1.0	Wyneken (2002).
5	Cetacean species identification	P	2.0	ACCOBAMS (2021).
6	Sea turtle necropsy practical – anatomy, sampling, data collection and storage protocols	FEX	6.0	Wyneken (2002). IJsseldijk, et al. (2019).
<b>Threats to sea turtles and cetaceans</b>				
7	Introduction to anthropogenic threats to marine megafauna	L	1.0	Norse & Crowder (2005). ACCOBAMS (2021).
8	Fishing and the effects of different fisheries techniques on bycatch of protected species	L	3.0	Casale (2011). Lewison, et al. (2014). Carpentieri & Gonzalvo (2022).
9	Shipping, energy production, underwater noise, and collisions and impacts with cetaceans and sea turtles.	L	2.0	Harding & Cousins (2022).
10	Tourism and disturbance impact on cetaceans and sea turtles	L	1.0	Rako, et al. (2013). Pennino, et al. (2016).
11	Cetacean vocalization and underwater noise	FEX	2.0	Robson, et al. (2014).
12	Plastic and marine debris	L	1.0	Vegter, et al. (2014).
13	Impact of plastic pollution on cetaceans and sea turtles	P	1.0	Senko, et al. (2020).
14	Impact of plastic pollution on cetaceans and sea turtles – beach clean-up	FEX	1.0	Senko, et al. (2020).
<b>Cetaceans and sea turtle care and handling</b>				
15	Introduction to the rescue center and management	FEX	1.0	
16	Handling of stranded, injured and by-caught cetaceans	L	2.0	Saviano, Guglielmi, and Mazzariol (2015).
17	Rescue course on strandings and disentanglement of cetaceans	FEX	4.0	Saviano, Guglielmi, and Mazzariol (2015).
18	Handling of stranded, injured and by-caught sea turtles	L	2.0	Gerosa and Aureggi (2001).

No	Title and outline	Type	Time (hrs)	Required Readings
19	Manipulation and clinical examination of sea turtles	L	2.0	Tristan and Norton (2017).
20	Diagnostics and sampling of sea turtles for laboratory analyses and diagnostic imaging	L	1.0	Pease, et al. (2017). Stacy and Innis (2017).
21	Diagnostics and sampling of sea turtles for laboratory analyses and diagnostic imaging	FEX	2.0	Holmes and Divers (2019). Raiti P. (2019).
22	Microscopic analysis of clinical samples (blood, swabs, and feces) during rehabilitation of sea turtles	FEX	2.0	Stacy, et al. (2019).
23	Infectious, non-infectious, and parasitic diseases in sea turtles	L	1.0	Rodriguez, et al. (2018). Chapman, et al. (2019). Harms (2017). Karjian (2017). Innis (2017).
24	Infectious, non-infectious, and parasitic diseases in sea turtles	FEX	1.0	
25	Sea turtle care and therapy administration	L	1.0	Innis, et al. (2017). Davies and Klingenberg (2004).
26	Sea turtle care and therapy administration	FEX	1.0	Harms and Wyneken (2019).
27	The most common pathologies and their treatment	L	1.0	Mettee and Norton (2017). Innis and Staggs (2017). Manire, et al. (2017). Manire, et al. (2017).
28	The most common pathologies and their treatment	FEX	1.0	
29	Emergency medicine	L	2.0	Di Bello and Lai (2013). Norton, et al. (2017).
		<b>Total</b>	<b>50</b>	
		<b>UMN Instructional Hours*</b>	<b>60</b>	

\*UMN defines an instructional hour as a 50-minute block. SFS syllabi are written in full 60-minute hours for programming purposes. Therefore 50 full hours = 60 UMN instructional hours (for four credit courses) and 25 full hours = 30 UMN instructional hours (for two credit courses).

## Reading List

---

\*Readings in **Bold** are required

1. **ACCOBAMS (2021)**. Conserving Whales, Dolphins and Porpoises in the Mediterranean Sea, Black Sea, and adjacent areas: an ACCOBAMS status report, (2021). By: Notarbartolo di Sciarra G., Tonay A.M. Ed. ACCOBAMS, Monaco. 160 p.
2. Berta, A., Sumich J. L., and Kovacs K. M. (2015). Marine mammals: Evolutionary biology. Third edition. Elsevier. 726 pp.
3. **Carpentieri, P. & Gonzalvo, J. (2022)**. Dolphin depredation in Mediterranean and Black Sea fisheries – Methodology for data collection. FAO Fisheries and Aquaculture Technical Paper No. 688. Rome, FAO. <https://doi.org/10.4060/cc2943en>
4. Casale P., Broderick A.C., Camiñas J.A., Cardona L., Carreras C., Demetropoulos A., Fuller W.J., Godley B.J., Hochscheid S., Kaska Y. and Lazar B. (2018). Mediterranean Sea turtles: current knowledge and priorities for conservation and research. *Endangered Species Research*, 36, p.229-267. DOI: 10.3354/esr00901
5. **Casale, P. (2011)**. Sea turtle by-catch in the Mediterranean. *Fish and Fisheries*, 12, 3: 299–316. <https://doi.org/10.1111/j.1467-2979.2010.00394.x>
6. **Chapman P. A., Cribb T. H., Flint M., Traub R. J., Blair D., Kyaw-Tanner M. T., Mills P. C. (2019)**. Spirorchidiasis in marine turtles: the current state of knowledge. *Diseases of Aquatic Organisms*, 133:217-245.
7. **Davies R. R., Klingenberg R. J. (2004)**. Therapeutics and medication. In: BSAVA Manual of Reptiles, second edition (Girling S. J., Raiti P, eds). British small animal veterinary association, UK. Pp: 115-130.
8. **Di Bello, A. & Lai, O. (2015)**. First Aid and Management Procedures of Sea Turtles. Output from Project NETCET, Adriatic IPA Programme, Pp. 26.
9. **Harding, S. and Cousins N. (2022)**. Review of the Impacts of Anthropogenic Underwater Noise on Marine Biodiversity and Approaches to Manage and Mitigate them. Technical Series No. 99. Secretariat of the Convention on Biological Diversity, Montreal, 145 pages
10. Harms C. A. (2017). Parasitology. In: *Sea Turtle Health and Rehabilitation* (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 727-747
11. **Harms C. A., Wyneken J. (2019)**. Sea turtles. In: *Mader's Reptile and Amphibian Medicine and Surgery* (Divers S. J., Stahl S. J., eds). Elsevier, USA. Pp. 180-193.
12. Haywood J.C., Casale P., Freggi D., Fuller W.J., Godley B.J., Lazar B. et al. (2020). Foraging ecology of Mediterranean juvenile loggerhead turtles: insights from C and N stable isotope ratios. *Marine Biology*, 167(3), 1-15.
13. Holmes S. P., Divers S. J. (2019). Radiography – Chelonians. In: *Mader's Reptile and Amphibian Medicine and Surgery* (Divers S. J., Stahl S. J., eds). Elsevier, USA. Pp. 514-527.
14. **Ijseldijk, L.L., Brownlow, A.C., Mazzariol, S. (2019)**. Best practice on cetacean post mortem investigation and tissue sampling Joint ACCOBAMS and ASCOBANS document
15. Innis C. J. Staggs L. A. (2017). Cold – stunning. In: *Sea Turtle Health and Rehabilitation* (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 675-685



16. Innis C. J., Frasca Jr S. (2017). Bacterial and fungal Diseases. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 779-787
17. **Innis C. J., Harms C. A., Manire C. A. (2017).** Therapeutics. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 497-526
18. Karjian A. P., Herbst L. H. (2017). Viruses. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 751-773
19. Lewison, R. L., Crowder, L. B., Wallace, B. P., Moore, J. E., Cox, T., Zydels, R., et al. (2014). Global patterns of marine mammal, seabird, and sea turtle bycatch reveal taxa-specific and cumulative megafauna hotspots. *Proceedings of the National Academy of Science* 111, 5271–5276. doi: 10.1073/pnas.1318960111.
20. Manire C. A., Norton T. M., Walsh M. T., Campbell L. A. (2017). Buoyancy Disorders. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 689-704.
21. Manire C. A., Stacy N. I., Norton T. M. (2017). Chronic Debilitation. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 707-723
22. Mazzariol, S. & Centellegh, C. (2015). Standard Protocol for Post-Mortem Examination on Cetaceans. Output from Project NETCET, Adriatic IPA Programme, Pp. 43.
23. Mazzariol, S., Cozzi, B., & Centellegh, C. (Eds.) (2015). Handbook for Cetaceans Strandings. The Coffee House Art & Media. Pp. 240.
24. Mettee N. S., Norton T. M. (2017). Trauma and wound care. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 657-673
25. Norse, E. A., & Crowder, L. B. (2005). *Marine conservation biology: the science of maintaining the sea's biodiversity*. Island Press: Washington D.C. ISBN 1-55963-662-9. 470 pp.
26. Norton T. M., Innis C. J., Manire C. A. (2017). Critical care and emergency medicine. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 483-495
27. **Pease A., Di Bello A., Rivera S., Valente A. L. S. (2017).** Diagnostic imaging. In: Sea Turtle Health and Rehabilitation (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 123-141
28. Pennino M.G., Pérez Roda M.A., Pierce G.J. & Rotta A. (2016). Effects of vessel traffic on relative abundance and behaviour of cetaceans: the case of the bottlenose dolphins in the Archipelago de La Maddalena, north-western Mediterranean sea. *Hydrobiologia* 776, 237-48.
29. Piwetz S., Gailey G., Munger L., Lammers M.O., Jefferson T.A. & Würsig B. (2018). Theodolite tracking in marine mammal research: From Roger Payne to the present. *Aquatic Mammals* 44, 683-93.
30. Poppi, L. & Marchiori, E. (2015). Standard Protocol for Post-Mortem Examination on Sea Turtles. Output from Project NETCET, Adriatic IPA Programme, Pp. 35.
31. Raiti P. (2019). Non – invasive imaging. In: BSAVA Manual of Reptiles, third edition (Girling S. J., Raiti P., eds). British small animal veterinary association, UK. Pp. 134-155

32. **Rako N., Fortuna C.M., Holcer D., Mackelworth P., Nimak-Wood M., Pleslić G., Sebastianutto L., Vilibić I., Wiemann A. & Picciulin M. (2013).** Leisure boating noise as a trigger for the displacement of the bottlenose dolphins of the Cres–Lošinj archipelago (northern Adriatic Sea, Croatia). *Marine Pollution Bulletin* 68, 77-84.
33. **Robinson, S.P.; Lepper, P. A. and Hazelwood, R.A. (2014).** Good Practice Guide for Underwater Noise Measurement. Teddington, England, National Measurement Office, Marine Scotland, The Crown Estate, 95pp. (NPL Good Practice Guide No. 133). DOI: <http://dx.doi.org/10.25607/OBP-21>
34. **Rodriguez C. A., Henao Duque A. M., Steinberg J., Woodburn D. B. (2018).** Chelonia. In: *Pathology of Wildlife and Zoo animals* (Terio K. A., McAloose D., St Leger J., eds). Elsevier, UK. Pp. 819-847
35. **Saviano, Guglielmi & Mazzariol (2015).** First response for cetaceans stranded alive. In: Mazzariol, S., Cozzi, B., Centelleghes, C. *Handbook for Cetaceans' Strandings*. NETCET Project. 169-205
36. **Senko, J., Nelms, S., Reavis, J., Witherington, B., Godley, B., and Wallace, B. (2020).** Understanding individual and population-level effects of plastic pollution on marine megafauna. *Endangered Species Research* 43, 234–252. doi: 10.3354/esr01064.
37. Stacy N. I., Innis C. J. (2017). Clinical Pathology. In: *Sea Turtle Health and Rehabilitation* (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 148-188
38. Stacy N., Heard D., Wellehan J. (2019). Diagnostic sampling and laboratory tests. In: *BSAVA Manual of Reptiles*, third edition (Girling S. J., Raiti P., eds). British small animal veterinary association, UK. Pp. 115-126
39. Tolve L., Casale P., Formia A., Garofalo L., Lazar B., Natali C., Novelletto A., Vallini C., Bužan E., Chelazzi G., Gaspari S., Fortuna C., Kocijan I., Marchiori E., Novarini N., Poppi L., Salvemini P. and Ciofi C. (2018). A comprehensive mitochondrial DNA mixed-stock analysis clarifies the composition of loggerhead turtle aggregates in the Adriatic Sea. *Marine Biology*, 165, p.68.
40. Tristan T. E., Norton T. M. (2017). Physical examination. In: *Sea Turtle Health and Rehabilitation* (Manire C. A., Norton T. M., Stacy B. A., Innis C. J. Harms C. A., eds). J. Ross Publishing, USA. Pp. 99-120.
41. **Vegter, A.C., Barletta, M., Beck, C., Borrero, J., Burton, H., Campbell, M.L., Eriksen, M., Eriksson, C., Estrades, A., Gilardi, K., Denise Hardesty, B., Assunção Ivar do Sul, J., Lavers, J.L., Lazar, B. et al. (2014).** Global research priorities for the management and mitigation of plastic pollution on marine wildlife. *Endangered Species Research* 25: 225-247.
42. Würsig B., Thewissen J. G. M. and Kovacs K. (Eds.). (2017). *Encyclopedia of marine mammals*. Academic Press, USA.
43. Wyneken J., Lohmann K.J. and Musick J.A. (Eds.) (2013). *The Biology of Sea Turtles*, Vol. 3. CRC Press, Boca Raton, USA.
44. **Wyneken, J. (2002).** *The anatomy of sea turtles*. Miami, FL 33149: National Oceanic and Atmospheric Administration.