



THE SCHOOL
FOR FIELD STUDIES



Sea Turtle Rescue and Rehabilitation

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.

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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

The monitoring of live, stranded and dead sea turtles 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. 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 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 sea turtles. This course will cover relevant parts of sea turtle 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

After taking this course, students will:

1. Knowledge and understanding:
 - Be able to identify distinct species of sea turtles.
 - The use of state-of-the-art technologies for monitoring and tracking sea turtles, including drone and satellite tracking.
 - Identify and be familiarized with the main anatomical and morphological features and adaptations of sea turtles.
 - Understand diagnostic techniques and necropsy procedures.
 - Understand safety protocols for live animal rescue and post-mortem analysis (incl. injuries and zoonotic diseases).
 - Understand main threats (inc. fisheries, boat collision, and pollution) to sea turtles in the marine environment.

2. Reflection:
 - a. Able to critically discuss impact of anthropogenic threats to sea turtles.
 - b. Able to carry out basic sampling during postmortem on sea turtles.
 - 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 conservation strategies for these species.

Assessment

The evaluation breakdown for the course is as follows:

Assessment Item	Value (%)
Participation	10
Quiz	20
Group Field Report – Fisheries and Bycatch	25
Group Presentation – Threats, Care, and Handling	25
Field Exercises	20
TOTAL	100

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 (20%)

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

Group field report – fishery and bycatch (25%)

The assignment will be in the format of a group field report, asking students to evaluate in groups the fishing fleet composition of Lošinj island and additionally analyze the fishing effort through Automated Identification System of fishing vessels within selected geographical area and temporal scale. Groups will be asked to write the report following common guidelines for scientific field reports and discuss the results in relation to sea turtle bycatch and mortality in Adriatic Sea.

Group presentation – threats, care and handling (25%)

The assignment will be in the format of a group presentation asking students to explore in groups threats to sea turtles, as well as the appropriate care and handling procedures related to different threats. Groups will be required to research a topic related to the assigned threat, make the group presentation to the classroom and then lead a short, focused discussion related to the presentation topic.

Field Exercises (20%)

Students will be assessed based on their participation in practical activities of sea turtle care, handling, and research.

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.

AI Usage for Assignments – SFS acknowledges the growing role of artificial intelligence (AI) tools in education and professional settings. While AI can be a valuable resource for learning and productivity, its use must align with the learning goals and integrity of each assignment. For this reason, students are encouraged to discuss the acceptable uses of AI for each assignment with the instructor. If you wish to use AI for any part of an assignment, consult with the instructor beforehand to ensure that its use adheres to the academic expectations of the course. Let’s work together to navigate this evolving landscape responsibly!

Course Content

Type: O: Orientation, **L:** Lecture, **FL:** Field Lecture, **FEX:** Field Exercise, **DEX:** Desk Exercise, **D:** Discussion

*Readings in **Bold** are required.

No	Title and outline	Type	Time (hrs)	Required Readings
1	Course Introduction	O	0.5	
2	Introduction to the turtle rescue centre	FL	1.0	
3	Sea turtle morphology & anatomy	L	1.0	Wyneken (2001)
4	Sea turtle species identification	DEX	1.0	Wyneken (2001)
5	Sea turtle biology and ecology Evolution & Systematics	L	1.0	Lutz, et al. (2002)
6	Sea turtle biology and ecology Life history types	L	1.0	Lutz, et al. (2002)
7	Sea turtle biology and ecology Thermo-biology and regulation	L	1.0	Lutz, et al. (2002)
8	Sea turtle biology and ecology Reproductive biology	L	1.0	Lutz, et al. (2002)
9	Sea turtle biology and ecology In-water biology	L	3.0	
10	Mapping Practical Oceanography of Med & Adriatic Seas in relation to sea turtle life history and habitat use	DEX	1.0	Casale, et al. (2018)
11	Field Exercise Satellite tracking of sea turtles	FEX	3.0	
12	Drone Workshop The use of drones for assessing at surface abundance of sea turtles – intro and prep	L	1.0	Rees, et al. (2018)
13	Drone Workshop Drones for assessing at surface abundance of sea turtles – field use	FEX	2.0	
14	Fisheries and bycatch	L	1.0	Casale (2011)

No	Title and outline	Type	Time (hrs)	Required Readings
	The effects of different fisheries techniques on bycatch and survival of sea turtles.			Lewison, et al. (2014)
15	Harbour tour Fishing fleet of Lošinj	FL	2.0	
16	Handling of stranded, injured and by-caught sea turtles	FEX	2.0	Gerosa and Aureggi (2001)
17	Manipulation and clinical examination of sea turtles	L	2.0	Di Bello, A., Lai, O. (2015) Tristan and Norton (2017)
18	Diagnostics and sampling Laboratory analyses and diagnostic imaging – intro	L	1.0	Pease, et al. (2017) Stacy and Innis (2017)
19	Diagnostics and sampling Laboratory analyses and diagnostic imaging – practical	FEX	3.0	Holmes and Divers (2019) Raiti P. (2019)
20	Husbandry Sea turtle care and therapy administration – intro	L	1.0	Innis, et al. (2017) Davies and Klingenberg (2004)
21	Husbandry Sea turtle care and therapy administration - practical	FEX	1.0	Harms and Wyneken (2019)
22	Pathology The most common pathologies and their treatment - intro	L	1.0	Mettee and Norton (2017) Innis and Staggs (2017) Manire, et al. (2017)
23	Pathology The most common pathologies and their treatment - practical	FEX	1.0	Mettee and Norton (2017) Innis and Staggs (2017) Manire, et al. (2017)
24	Necropsy Necropsy techniques & practical – anatomy, sampling, data collection and storage protocols.	FEX	3.0	Wyneken (2001)
25	Diseases Infectious, non-infectious and parasitic diseases	L	2.0	Rodriguez, et al. (2018) Chapman, et al. (2019) Innis (2017) Harms C. A. (2017) Karjian A. P. (2017)
26	Plastic and marine debris - intro	L	2.0	Vegter, et al. (2014)
27	Plastic and marine debris - practical	FEX	3.0	Senko et al. (2020)
28	Feeding ecology and Parasitology Sampling methods and analysis - practical	DEX	6.0	
30	Debrief & Course Wrap Up	D	1.5	
		Total	50	
		UMN instructional hours*	60	

*[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. 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
2. **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>
3. **Chapman P. A., Cribb T. H., Flint M., Traub R. J., Blair D., Kyaw-Tanner M. T., Mills P. C. (2019)**. Spirorchidiiasis in marine turtles: the current state of knowledge. *Diseases of Aquatic Organisms*, 133:217-245. <https://www.int-res.com/articles/dao2019/133/d133p217.pdf>
4. **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.
5. **Di Bello, A. & Lai, O. (2015)**. First Aid and Management Procedures of Sea Turtles. Output from Project NETCET, Adriatic IPA Programme, Pp. 26. https://www.blue-world.org/bw/wp-content/uploads/2017/05/NETCET_Standard-protocols-physical-examination-of-stranded-sea-turtles.pdf
6. **Gerosa G., Aureggi M. (2001)**. Sea Turtle Handling Guidebook for Fishermen. UNEP/MAP - RAC/SPA https://www.medasset.org/wp-content/uploads/2015/08/Fisherman-guidebook_EN.pdf
7. 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
8. 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.
9. 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.
10. 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.
11. 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
12. 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
13. **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
14. 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
15. 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.

16. Lutz, P.L., Musick, J.A., & Wyneken, J. (Eds.). (2002). *The Biology of Sea Turtles, Volume II* (1st ed.). CRC Press. <https://doi.org/10.1201/9781420040807>
17. 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.
18. 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
19. 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
20. 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
21. **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
22. Poppi, L. & Marchiori, E. (2015). Standard Protocol for Post-Mortem Examination on Sea Turtles. Output from Project NETCET, Adriatic IPA Programme, Pp. 35.
23. 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
24. Rees, A. F., Avens, L., Ballorain, K., Bevan, E., Broderick, A. C., Carthy, R. R., ... & Godley, B. J. (2018). The potential of unmanned aerial systems for sea turtle research and conservation: a review and future directions. *Endangered Species Research*, 35, 81-100.
25. **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
26. **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. <https://www.int-res.com/articles/esr2020/43/n043p234.pdf>
27. 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
28. 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
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31. **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. https://www.int-res.com/articles/esr_oa/n025p225.pdf
32. Wyneken J., Lohmann K.J. and Musick J.A. (Eds.) (2013). *The Biology of Sea Turtles*, Vol. 3. CRC Press, Boca Raton, USA.
33. **Wyneken, J. (2001).** The anatomy of sea turtles. Miami, FL 33149: National Oceanic and Atmospheric Administration. https://www.dnr.sc.gov/seaturtle/Literature/TM_470_Wyneken.pdf