

Life Support System Design and Operation

AQS240 | Fall 2026

Instructor Information

Name: Trevor Erdmann

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Office Room: NA

Office Phone: NA

Office Hours: By Appointment

Secondary Contact: Dr. Carla Schubiger, Dean of Aquarium Science,

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- Dr. Sarah Whiteford, Dean of CTE and Academic Pathways,
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Course Information

Class Room: 245

Class Meeting time: T/R 9:00-10:35 AM Lab: R 10:45-12:55 (AQS Building)

Textbook: AALSO Field Guide (2017-2020, Version 5.1 Editions)

Learning Management System: All courses are web-enhanced, and all students are required to have access to Canvas which can be accessed through the main OCCC website at OregonCoast.edu. All faculty must use Canvas gradebook so that students can easily track their grades.

Important dates

Last day to drop* with a refund in first week: See the [2026-2027 Academic Calendar](#)

Last day to withdraw* with a 'W': See the [2026-2027 Academic Calendar](#)

**Be aware that dropping/withdrawing from a course may affect your financial aid*

Students are responsible for adding, dropping, and withdrawing from classes by published deadlines. The drop and withdraw deadlines are on the academic calendar. Beginning the second week, until the deadline published on the academic calendar each term, students may withdraw from classes. A mark of "W" will appear on their transcript. Tuition and fees remain on the student account when a student chooses to withdraw from a class.

Syllabus Changes:

This syllabus serves only as a guide to this course. The instructor reserves the right to change any part of this syllabus at any time due to any variety of circumstances. Methods and criteria used to evaluate student performance may also change. If and when changes occur, students will be informed in writing. Students are responsible to keep

informed of syllabus changes as they occur by attending and participating in class and communicating with the instructor.

Course Description

Examines the role of life support systems in maintaining a balanced, stable aquatic environment. Covers how to design, construct, maintain, and troubleshoot semi-closed, closed and open systems.

Course Outcomes

1. Identify water quality parameters impacted by life support systems and relate the use of associated equipment to evaluate aquatic environments.
2. Identify the functions and the relationships of life support system components in maintaining a balanced aquatic system.
3. Size and select appropriate life support system components and equipment for an aquatic system.
4. Troubleshoot and remedy faulty life support system components.
5. Diagram the flow of water from its source to its discharge location.
6. Design and build an aquatic life support system.

Student Conduct

Academic Integrity

Learning is built on the fundamental qualities of honesty, fairness, respect, and trust. At Oregon Coast Community College, academic integrity is a shared endeavor characterized by truth, personal responsibility and high academic standards. Any violation of academic integrity devalues the individual and the community. One important aspect of academic integrity is academic honesty.

Violations of academic honesty include:

- Plagiarism
- Collusion/Inappropriate Assistance
- Cheating
- Fabrication/Falsification/Alteration
- Unauthorized Multiple Submission
- Sabotage and Tampering

A student who violates academic honesty will be subject to disciplinary action according to Student Rights and Responsibilities.

Artificial Intelligence Policy

Generative AI tools (ChatGPT, Claude, Gemini, Copilot, AI rewriting or summarizing tools, and similar) may not be used for any work in this course. Submitting content that was generated, drafted, translated, or substantially revised by AI as your own work constitutes plagiarism and unauthorized assistance under OCCC's academic integrity policy, as does fabricating AI-generated citations, using AI during an assessment, or misrepresenting whether you used it. Violations will receive a zero on the assignment and maybe reported, with more serious sanctions for concealment or repeat offenses. If you are unsure whether a tool is permitted, ask me before you use it.

Policy on Mobile Communication Devices

Unless otherwise approved by the instructor, students are not permitted to operate cell phones or pagers during class or laboratory sessions, as these devices disrupt learning and teaching activities. There may be times during class when you will be permitted to use a mobile device to participate in course activities. Otherwise, students should use such communication devices only during class breaks outside the classrooms. Discuss exceptions with Instructor.

Students Rights and Responsibilities

The Student Rights and Responsibilities in the Student Handbook establishes students' freedom and protections as well as expectations of appropriate behavior and ethical academic work [<https://catalog.oregoncoastcc.org/student-handbook>].

Children on OCCC Property

Students are not allowed to bring children to classes or leave them unattended on campus. We expect compliance from both students and faculty regarding this policy.

Enrolled Minors

The college offers programs that allow minors (students under 18) to enroll in college courses. Students are advised to foster relationships that are age appropriate with classmates.

Attendance

Students are expected to attend all classes in which they are enrolled.

Students must attend and complete required assignments for the first week of the course or be administratively dropped from the course for non-attendance, unless arrangements have been made with the instructor in advance. Attendance is taken in all classes in the first week of the term. Instructors typically continue to take attendance all term.

Repeated absences will affect your grade.

Students are responsible for dropping or withdrawing from registered classes by talking with your Success Coach and completing the official drop/withdrawal process (see [Withdrawal | Oregon Coast Community College](#).) Students who stop attending or have excessing absences and who fail to drop or withdraw from a class by the published deadline may earn a grade of F or NP according to the grade system option selected by the student. Students who fail to attend or stop attending classes and fail to drop those classes by the published drop deadline will be responsible for the associated tuition and fees.

Students may not attend classes they are not registered for.

Course Information

3 quizzes, during weeks 4a, 7a and 10a, focusing on the course material covered. 10 Labs, participation of the weekly lab task and group lab project. Group project consisting of building a theoretical LSS system for an assigned scenario, with a paper and group presentation due at the end of the term. Final exam consisting of comprehensive course materials over the semester and the AALSO Level 1 operator test. Practical lab final covering practical skills learned in lab.

Grades

Point Breakdown:

Quizzes (3 @ 20 pts each)	60
Laboratory Exam	100
Final Exam	100
Lab Participation/Projects	100
Term Project w/presentation	<u>100</u>
TOTAL	<u>460</u>

Grading Scale

A = 90% - 100%

B = 80% - 89%

C = 70% - 79%

D = 60% - 69%

F = 0% - 59%

Course Schedule

Week	Date	Topics	Assignments/Activities
1a	Sept. 22	<u>Lecture</u> (1) Course Overview and Introduction to LSS (2) Planning for LSS: Design and Operational Considerations	<u>Reading</u> <i>Tech Talk</i> – 119 <i>Design and Operating Guide for Aquaculture Seawater Systems</i> (Excerpt 1) – Canvas <i>Planning a Custom Aquarium</i> – Canvas
1b	Sept. 24	<u>Lecture</u> Planning for LSS: Layout & Logistics	<u>Reading</u> <i>Example of a LSS Design Specification</i> – Canvas <i>Design and Operating Guide for Aquaculture Seawater Systems</i> (Excerpt 2) – Canvas AALSO Field Guide Chapter 1, 14
		<u>Lab</u> LSS Mapping	<u>Activity</u> LSS Mapping Activity
2a	Sept. 29	<u>Lecture</u> Building Life Support Systems: Plumbing & Structural Materials	<u>Reading</u> <i>Tech Talk</i> – 14 and 15 <i>Tool Safety</i> – Canvas AALSO Field Guide Chapters 8, 11.7-11.10
2b	Oct. 1	<u>Lecture</u> Fluid Dynamics: Circulation and Water Flow	<u>Reading</u> <i>Tech Talk</i> – 13, 33, 44, 61, 118 AALSO Field Guide Chapters 14, 16, 18

		<u>Lab</u> PVC pipe, fittings and valves	<u>Activity</u> ASME B31.3 Solvent welding Certification with Spears Manufacturing
3a	Oct. 6	<u>Lecture</u> Fluid Dynamics: Pumps	<u>Reading</u> <i>Tech Talk</i> – 10, 11, 12, 32, 75, 93, 110 AALSO Field Guide Chapter 7
3b	Oct. 8	<u>Lecture</u> Aeration: Solubility and Gas Exchange	QUIZ 1 <u>Reading</u> <i>Tech Talk</i> – 1, 7, 9, 52, 80 AALSO Field Guide Chapter 3.3.4-3.3.6
		<u>Lab</u> Pumps types, anatomy and installation	<u>Activity</u> Mock-up Activity: Assembling and Installing a Pump and Bulkhead Fitting Mock-up Activity: Installing a Canister Filter with a By-pass Loop
4a	Oct. 13	<u>Lecture</u> Aeration: Components and Equipment	<u>Reading</u> <i>Tech Talk</i> – 2, 3, 4, 35, 53, 62, 63, 64, 83 <i>Sweetwater Guide to Designing Air Distribution Systems for Regenerative Blowers</i> - Canvas
4b	Oct. 15	<u>Lecture</u> Filtration Theory/Mechanical Filtration	<u>Reading</u> <i>Tech Talk</i> – 43, 45, 48, 65, 99, 115 AALSO Field Guide Chapter 9.1
		<u>Lab</u> Aeration Equipment	<u>Activity</u> Demo: Air pumps and diffusers Lab Projects: Continue set-up of layout and equipment.
5a	Oct. 20	<u>Lecture</u> Chemical Filtration	<u>Reading</u> <i>Marine Aquarium Reference (MAR)</i> - Ch. 4 (pgs. 191-200, 222-232) <i>Tech Talk</i> – 42 AALSO Field Guide Chapters 5.9-5.10, 6.6, 9.3
5b	Oct. 22	<u>Lecture</u> Foam Fractionation	<u>Reading</u> <i>MAR</i> – Ch. 4 (pgs. 272-287) <i>Tech Talk</i> – 63, 72 <i>To Skim or Not to Skim: That is the Question</i> - Canvas
		<u>Lab</u> Filter Components and Media	<u>Activity</u> Demo: Filters; mechanical, chemical, and protein skimmers Lab Projects: Continue set-up of layout and equipment.
6a	Oct. 27	<u>Lecture</u> Biological Filtration: Application and Types	<u>Reading</u> <i>MAR</i> – Ch. 4 (pgs. 232-265) <i>Tech Talk</i> – 106,125 AALSO Field Guide Chapters 5.1-5.7, 9.2
6b	Oct. 29	<u>Lecture</u> Biological Filtration: Size and Selection	QUIZ 2 <u>Reading</u> <i>Tech Talk</i> – 95, 112, 128
		<u>Lab</u> Bio-filters and Bio-media	<u>Activity</u> Demo: Review types of bio-filters/media

			Lab Projects: Set-up (equipment selection)
7a	Nov. 3	<u>Lecture</u> Temperature Control; Heating and Chilling	<u>Reading</u> <i>Tech Talk</i> – 55, 59, 74 AALSO Field Guide Chapter 12
7b	Nov. 5	<u>Lecture</u> Sterilization; UV and Ozone	<u>Reading</u> <i>MAR</i> – Ch. 4 (pgs. 287-302) <i>Tech Talk</i> – 25, 71, 72, 96 <i>Understanding Ozone Manufactured from Oxygen vs. Dried Air</i> – Canvas AALSO Field Guide Chapters 5.8, 10
		<u>Lab</u> Heaters, Chillers and Sterilizers	<u>Activity</u> Demo: Chiller, UV and ozone components Lab Projects: Continue set-up of layout and equipment.
8a	Nov. 10	<u>Lecture</u> Reactors and Water Conditioners	<u>Reading</u> <i>Tech Talk</i> – 103, 113 AALSO Field Guide Chapter 6.1-6.5
8b	Nov. 12	<u>Lecture</u> Monitoring, Automation and Control (tentative) Lighting (tentative)	<u>Reading</u> <i>MAR</i> – Ch.4 (pgs. 154-164)
		<u>Lab</u>	<u>Activity</u> Lab Projects continued
9a	Nov. 17	<u>Lecture</u> Term Project Presentations	QUIZ 3 TERM PROJECT DUE <u>Reading</u> AALSO Field Guide Chapter 13 <i>TBD</i> – will be posted on Canvas <i>Future of Life Support Systems: Forces of Change and Probable Response</i> – Canvas
9b	Nov. 19	<u>Lecture</u> Term Project Presentations Final Exam Review	<u>Reading</u>
		<u>Lab</u> Lab Project	<u>Activity</u> N/A
10a	Nov. 24	<u>Lecture</u> Final Exam Review Finish Lab Projects	<u>Reading</u> <i>TBD</i> – will be posted on Canvas <i>Future of Life Support Systems: Forces of Change and Probable Response</i> – Canvas
		<u>Lab</u> Finish Lab Projects	<u>Activity</u> Practice component identification Finish Lab Projects/Troubleshooting Lab

10b	Nov. 26	<u>Lecture</u> Thanksgiving Day	<u>Reading</u>
11a	Dec. 1	FINAL EXAM	N/A
11b	Dec. 3	No Lecture	Study for Lab Final ☺
		<u>Lab</u> LAB FINAL EXAM @ 10:30-12:30	

Student Resources:

Americans with Disabilities Act

In compliance with the Americans with Disabilities Act (ADA), Oregon Coast Community College provides reasonable accommodation to students with disabilities. If you desire reasonable accommodation, please contact The Office of the Vice President Student Affairs (400 SE College Way, Newport, OR 97366) at 541-867- 8501, or you can email access@oregoncoast.edu. *Students are responsible for requesting accommodations in a timely manner and documenting the nature and extent of their disability.*

OCCC Email

OCCC email is the official form of communication of Oregon Coast Community College. If you have any difficulties accessing your OCCC email address please contact support at helpdesk@oregoncoast.edu

Emergency Funds

If you are experiencing challenges securing food, transportation, or housing, or have other financial issues that are affecting your ability to attend and succeed in class(es), we encourage you to apply for emergency funds. Please call, email, or visit Student Services for assistance (phone: 541-867-8544). If you are comfortable doing so, please let your instructor know about your situation. This will allow for a better understanding and could potentially lead to further support and/or resources.



Use this QR code to access the student resources webpage.

College Information

Land Acknowledgement

Oregon Coast Community College acknowledges that we reside within the ancestral homelands of the Yaquina (Yaqo'n) and Alsea (Wusi'n) Tribes. Today, those tribal

descendants are represented by The Confederated Tribes of Siletz Indians. We are honored for the opportunity to teach, learn, and work on their ancestral lands. We also recognize the ongoing contributions they make to the community, Oregon Coast Community College, and the world.

Mission Statement

At Oregon Coast Community College, we equip students for success by providing educational pathways and supports in response to the diverse needs of our community. Through accessible and engaging programs, we enrich the economic and civic vitality of Lincoln County and beyond.

Equal Opportunity and Non-Discrimination

Oregon Coast Community College does not discriminate on the basis of race, color, national origin, sex, disability, age, sexual orientation, gender identity, marital status, or religion in its programs and activities. The following individuals have been designated to handle inquiries regarding the non-discrimination policies:

- Vice President Academic and Student Affairs, Dr. Kristina Holton, 541-867-8511 kristina.holton@oregoncoast.edu, or
- Director of Human Resources, Joy Gutknecht, 541-867-8515 joy.gutknecht@oegoncoast.edu.

Updated 06/2026