MARICULTURE TECHNIQUES (FAMA 5312)
Department of Life Sciences
Fall 2019

A. COURSE INFORMATION
   Course number/section: FAMA 5312.001
   Class meeting time: MW 10:00-11:50 AM
   Class location: ECMS 207
   Course Website: https://bb9.tamucc.edu/ (Blackboard Sign In page)

B. INSTRUCTOR INFORMATION
   Instructor: John Scarpa, Ph.D.
   Office location: Tidal Hall 339
   Office hours: T, R, & F 8:00-10:00 AM and by appointment
   Telephone: (361) 825-2369
   e-mail: John.Scarpa@tamucc.edu
   Appointments: Made at least 24 hrs in advance by phone or e-mail

C. COURSE DESCRIPTION
   Catalog Course Description
   3 sem. hrs. (2:2) The study and hands-on application of biological, mechanical, and other concepts required to develop the skills and techniques necessary for efficient operation and management of public and private aquaculture facilities.

   Extended Course Description
   Aquaculture is the controlled cultivation of aquatic organisms. It currently supplies about 50% of all consumed seafood. Traditional capture fisheries landings worldwide have been flat for the past 30 years at approximately 90 million metric tonnes. With an increasing world population and increasing global demand for seafood, aquaculture is the only method to meet demand. Aquaculture output is needed to increase 50% by the year 2030 to meet the global demand; it has been increasing at an annual rate of 6.2% for the past decade.

   U.S. aquaculture production value is about $1.4B, but the U.S. still imports approximately 91% of its seafood, which has resulted in a U.S. seafood trade deficit of about $15 billion. Aquaculture is expanding globally necessitating the need for individuals trained in the different aspects of the industry to provide food for human consumption.

   The knowledge of aquaculture production systems and techniques may also be used for maintaining aquatic organisms for pleasure (hobbyist), education (zoos and aquariums), stock enhancement/restoration efforts, and science (e.g., zebrafish colonies for genetic studies, basic research of aquatic animals). This course will focus on recirculating systems design and operation, although certain aspects (e.g., water quality) do relate to pond systems.
D. **PREREQUISITES AND COREQUISITES**

**Prerequisites**

Undergraduate biology and chemistry science courses.

**Co-requisites**

Biological lab safety course – SMTE 0091 (Biological Lab Safety Seminar)

E. **REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES**

**Required Textbook(s) - NONE**

**Optional Textbook(s) or Other References**


**Supplies**

Should possess lab coat and protective eye-wear for working with chemicals and other potentially hazardous substances (e.g., systems) during lab and system maintenance.

F. **STUDENT LEARNING OUTCOMES AND ASSESSMENT**

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.
By the end of this course, students should be able to:

1. Perform conversions from English to metric units.
2. Define water quality variables and their typical ranges for aquaculture systems.
3. Measure the basic water quality variables in an aquaculture system using a variety of instrumentation or techniques and relate the values to culture needs.
4. Describe applicable equipment (e.g., biofilters, UV-sterilizers) and how they are used to maintain water quality in culture systems.
5. Describe the culture environment or methods for live feed (e.g., microalgae, brine shrimp, rotifers) production.
6. Describe, operate, and successfully maintain an aquaculture or aquaponic system.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

The course will be taught through traditional lectures with laboratory exercises that review and emphasize the lecture material. In addition, there will be a class project in which all students will participate in the construction, running, and maintenance of an aquaculture or aquaponic system. This class project will allow for students to learn first-hand the problems that may develop with a system without jeopardizing an actual commercial crop.

H. MAJOR COURSE REQUIREMENTS AND GRADING

The learning outcomes stated earlier will be assessed through a variety of methods as noted in the following table.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams (2)</td>
<td>40</td>
</tr>
<tr>
<td>Class Project Report</td>
<td>20</td>
</tr>
<tr>
<td>Final Exam*</td>
<td>25</td>
</tr>
<tr>
<td>Lab and Class Participation</td>
<td>15</td>
</tr>
</tbody>
</table>

*Entry to the classroom will be closed on the day of final exam soon as the first student to complete an exam has left the room. Students absent or arriving after room closure will receive a zero for the exam.

Grading: There will be a total of three (3) written exams. Exams may be composed of any, or all, of the following: multiple choice, matching, fill in the blank, problem solving and short essay. The final exam is a comprehensive exam. All exams count toward your class grade. No exam grade will be dropped. No make-up exams will be given. If an exam is missed with proper prior notification, the test may be taken as soon as possible after the exam date, but no later than the following class day. If the exam is not taken a grade of zero (0) will be entered. No extra credit assignments will be given. There will be a class project that occurs outside of the normal classroom meeting time lab, which will be graded through participation and a class project report due at the end of the semester (style will be discussed in class). Class attendance and participation will also be factored into your final grade. The grading scale is: A=89-100%, B=79-88%, C=69-78%, D=59-68%, and F=0-58%.
All grades will be rounded to the nearest whole number, therefore, a grade of 88.50% would be rounded to 89% (A) and a grade of 88.49% would be an 88% (B). **Last day to drop class** is 8 November and **to withdraw from the university** is 3 December. **This must be done by the student.**

I. **COURSE CONTENT/SCHEDULE**

<table>
<thead>
<tr>
<th>Class #</th>
<th>Date</th>
<th>Topic</th>
<th>Readings/Assign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26-Aug</td>
<td>Aqua Systems (Pond, RAS) Overview/Conversions</td>
<td>SRAC pub 0100, 0103, 0451, 0452, 0453, 5007</td>
</tr>
<tr>
<td>2</td>
<td>28-Aug</td>
<td><strong>LAB:</strong> Tour of lab areas and review of project</td>
<td></td>
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<tr>
<td>3</td>
<td>2 Sept</td>
<td><strong>Labor Day Holiday – No class</strong></td>
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<tr>
<td>4</td>
<td>4-Sept</td>
<td>Water Quality (T, S, DO, pH, NH₃, NO₂, NO₃)</td>
<td>SRAC 0461, 0462, 0463, 4603, 4604, 4606, 6003, 0101, 0102, 0160</td>
</tr>
<tr>
<td>5</td>
<td>9-Sept</td>
<td><strong>LAB:</strong> Water Quality (T, S, DO, pH, NH₃, NO₂, NO₃)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>11-Sept</td>
<td>Water Quality (Alkalinity, Hardness, Carbonates)</td>
<td>SRAC 0464, 0468</td>
</tr>
<tr>
<td>7</td>
<td>16-Sept</td>
<td><strong>LAB:</strong> Water Quality (Alkalinity, Hardness, Carbonate)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>18-Sept</td>
<td>Biofilter Design</td>
<td>SRAC 4502</td>
</tr>
<tr>
<td>9</td>
<td>23-Sept</td>
<td><strong>LAB:</strong> Biofilter Lab (construct and measure)</td>
<td></td>
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<tr>
<td>10</td>
<td>25-Sept</td>
<td>Culture Units</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>30-Sept</td>
<td><strong>LAB:</strong> Initiate recirculating system</td>
<td>SRAC pub 0372, 0373, 0375</td>
</tr>
<tr>
<td>12</td>
<td>2-Oct</td>
<td><strong>Exam 1</strong></td>
<td>Exam Study</td>
</tr>
<tr>
<td>13</td>
<td>7-Oct</td>
<td><strong>LAB:</strong> Recirculating system care &amp; operations</td>
<td></td>
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<tr>
<td>14</td>
<td>9-Oct</td>
<td>Algae Culture</td>
<td>SRAC 5004</td>
</tr>
<tr>
<td>15</td>
<td>14-Oct</td>
<td><strong>LAB:</strong> Algae Culture Lab (and follow growth)</td>
<td></td>
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<tr>
<td>16</td>
<td>16-Oct</td>
<td>Fluid Mechanics and Pumps</td>
<td>SRAC 0372</td>
</tr>
<tr>
<td>17</td>
<td>21-Oct</td>
<td><strong>LAB:</strong> Airlifts</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>23-Oct</td>
<td>Gas Transfer &amp; Waste management</td>
<td>SRAC pub 3700, 0468, 0470, 4601</td>
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<tr>
<td>19</td>
<td>28-Oct</td>
<td><strong>LAB:</strong> Gas Transfer &amp; Waste management</td>
<td></td>
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<tr>
<td>20</td>
<td>30-Oct</td>
<td>Ozonation and UV-Irradiation</td>
<td>SRAC 4707/4708</td>
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<tr>
<td>21</td>
<td>4-Nov</td>
<td><strong>LAB:</strong> Biosecurity Lab (UV)</td>
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<tr>
<td>22</td>
<td>6-Nov</td>
<td><strong>Exam 2</strong></td>
<td>Exam Study</td>
</tr>
<tr>
<td>23</td>
<td>11-Nov</td>
<td>Aquatic Animal Disease</td>
<td>SRAC 0472, 4701, 4703</td>
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<tr>
<td>Date</td>
<td>Day</td>
<td>LAB: Aquatic Animal Diseases (Dermo)</td>
<td>SRAC 4704</td>
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<tr>
<td>24</td>
<td>13-Nov</td>
<td>Live Feeds Lab (rotifer count/brine shrimp decap)</td>
<td>SRAC Pub #701 &amp; 702</td>
</tr>
<tr>
<td>25</td>
<td>18-Nov</td>
<td>LAB: Live Feed Culture (Rotifers/Brine Shrimp)</td>
<td>SRAC Pub #701 &amp; 702</td>
</tr>
<tr>
<td>26</td>
<td>20-Nov</td>
<td>Open topic</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>25-Nov</td>
<td>LAB: System tear-down</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>27-Nov</td>
<td>Lab data review</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>2-Dec</td>
<td>Lab Reports Due (class discussion/review)</td>
<td>Lab Reports Due</td>
</tr>
<tr>
<td>30</td>
<td>4-Dec</td>
<td>Final Exam (Comprehensive)</td>
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<tr>
<td>31</td>
<td>9-Dec</td>
<td>NOTE Earlier Start Time 8:00-10:30 AM</td>
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</tbody>
</table>

**Note:** Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F. An outside-of-class field trip to a local aquaculture producer will be attempted.

**J. COURSE POLICIES**

**Attendance/Tardiness**

Each student’s individual career experiences provide valuable perspective to their peers. Therefore, it is critical that you attend class regularly to be a partner in this enhanced learning environment. At each class meeting, attendance will be noted. It is each student’s responsibility to contact the instructor directly (phone or e-mail), in advance, if class will be missed. The instructor will not accept late work without valid reasons. Students with a university approved scheduled absence (athletics, military duty, etc.) must contact the instructor well in advance (>72 hrs) of a scheduled absence. Exams may be taken early in those specific cases. Students who do not arrange to take exams ahead of time will not be eligible for this special consideration. A written excuse from the university department involved is required.

Students are encouraged to contact the instructor anytime they are not achieving their intended level of success, prior to taking any other action. Students who need to withdraw must complete an official form and submit it consistent with college policy no later than the official published date. “Incomplete” grades are awarded only when an emergency prevents a student from completing a minor portion of the course assignments. Active participation is a part of your grade. It includes (1) asking questions; (2) answering questions with supportive evidence; (3) responding to other student’s comments, etc. Students are expected to be on time for class, to address others with respect, and to project an attentive and concerned demeanor.

**Late Work and Make-up Exams**

All exams count toward your class grade. No exam grade will be dropped. No make-up exams will be given. If an exam is missed with proper prior notification, the test may be taken as soon as possible after the exam date, but no later than the following class day. If the exam is not taken a grade of zero (0) will be entered.
Extra Credit
No extra credit assignments will be given.

Cell Phone Use
The use of cell phones and other personal electronic devices (PEDs) are prohibited during class. All cell phones must be turned off during the class period. If you are emergency personnel (i.e., EMT, fire, or police) you may set your device to vibrate. Any student who uses a cell phone to make or answer a call, send and read text messages or e-mails (other than TAMUCC emergency messages), or any other use of a personal electronic device during class may have that device confiscated and be asked to leave class, which will be considered an absence for that class. No student has the right to disturb the teaching and learning process. Voice recording of lectures is allowed, but no video/photography are allowed during class, except with instructor permission.

Laptop Use
Laptop computers and tablets may be used in the classroom for taking notes, as long as they are not a nuisance to other students. However, laptops shall not be used for items as noted above for cell phones or PEDs.

Food in Class
There is NO eating or drinking in the classroom or in the lab.

Missed Exam
If an exam is missed with proper prior notification, the test may be taken as soon as possible after the exam date, but no later than the following class day. If the exam is not taken by then a grade of zero (0) will be entered. If the final is missed without proper prior notification and arrangement, a grade of zero will be entered for the final exam.

Participation
Four or more absences, with the exception of death in the nuclear family, sick child/spouse, or personal sickness may result in a failing grade at the discretion of the instructor. You must contact the instructor by phone message or e-mail before class to let the instructor know of your absence.

Other
Plagiarism and Cheating will not be tolerated.

Plagiarism: The Merriam-Webster Dictionary defines plagiarism as "To pass off as one’s own words or ideas of another.”
Plagiarism involves:
• Submitting another person's work as one's own
• Submitting work from any source that is not properly acknowledged by footnote, bibliography, or reference within a paper
• Submitting work pieced together from phrases and/or sentences from various sources without acknowledgement
• Submitting work with another person's phrase(s) rearranged without acknowledgement
• Submitting work that uses any phrase, sentence, or stylistic mannerism without acknowledgement
• Omitting quotation marks from any directly quoted material
• Failure to use three dots (...) to indicate omission of one or more words
• Any other actions deemed to be plagiarism by the faculty

Cheating is defined as:
• Copying to any extent the work of another student
• Intentionally assisting another student during an examination
• Having access to material related to an examination during an examination
• Possessing or having access to unauthorized copies of an examination
• Departing from any stated examination conditions

*Cheating or other academic dishonesty for exams and assignments will not be tolerated and will result in a Failing (F) grade for the class and suspension.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade. See Full University Policy at: http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity

• Classroom/Professional Behavior
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

• Statement of Civility
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the
University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116. If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816 or to http://disabilityservices.tamucc.edu/
• **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. **OTHER INFORMATION**

• **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

• **Methods of Achieving Success**
  Achieving success in this course will require a time commitment outside of class that averages three to six hours per week for reading and studying. Students benefit from actively participating in care of the aquaponic system, classroom discussion, and lab demonstrations and activities.

**GENERAL DISCLAIMER**

The instructor reserves the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. The instructor will announce such changes in a timely manner during regularly scheduled lecture or lab periods.