JOURNAL OF ECONOMICS TEACHING

Shrimply Irresistible – Sneaking economic content into a required general education course

This paper describes a general education course that has been infused with economic concepts. The paper demonstrates a technique commonly used in economic education materials for K-12 students: Include economic insight alongside other required materials. The paper provides a description of the general education course and how the economic content is woven into the curriculum. While the particular course is unique to a small number of colleges and universities similar to the author's institution, the author provides suggestions on where the economic lessons might fit into other courses.

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1. Introduction[1]

Economics, as a discipline, has a great deal to say about many more facets of societal interactions than students see in a typical introduction course. Rarely do academic economists have the opportunity to showcase the full breadth of economic thinking to non-majors. In this paper, I describe a fortuitous opportunity my institution offers that allows instructors to showcase economic logic to a group of students majoring in disciplines other than economics. I provide four examples of integrating important economic lessons into the general education course we offer our second-year students. Although the examples are constructed to be used in a non-economics class, they are sufficiently rich to serve as examples for economics classrooms.

Every student at my institution must take a second-year seminar, titled GC2Y (which stands for Georgia College second year), that is designed to equip them with the tools necessary to conduct research from a multidisciplinary and multicultural perspective. The course is housed in the Office of the Provost and, therefore, has no predetermined disciplinary focus. Professors from any discipline may create a section that highlights a global issue. Each section of the course[2] is different but must meet the following criteria: 1) address a problem from a multidisciplinary approach, 2) highlight multiple cultures, 3) incorporate a scaffolded written research project[3], and 4) make use of a fourth assigned hour outside of the classroom. The fourth-hour requirement provides an opportunity for students to see that what they learn in the classroom has relevance in their lives.

While the Office of the Provost does not require any department to develop and offer a GC2Y section, all are encouraged to do so. Fortunately, as a department, we recognize the opportunities offered by participating in the course. Previous research (Swinton et al., 2024) has shown that participating in similarly designed courses (for first-year students) provides a significant enticement for new majors. My department has encouraged its faculty to develop courses designed to meet our university's general education requirements. We currently offer three distinct first-year seminars and two second-year seminars.

The section that I created and will describe here focuses on shrimp as a food source. Using economics to study agricultural management, food production and distribution, and even food choices has a long and respected tradition. Both Home Economics and Agricultural Economics departments have long offered courses that teach the management of household resources and food production. A more recent trend is to slightly twist the focus from using economics to explain food to using food to explain economics. A case in point is the recent book, Ha-Joon Chang's Edible Economics: A Hungry Economist Explains the World (2022), which uses various culinary observations to demonstrate economic principles at work.

Shrimp, as a topic of economic interest, presents numerous avenues for study. It is an important global food source, widely traded, and in transition from a wild natural resource to

[1] Financial support provided by Georgia College & State University. The author thanks Brooke Conaway and participants at the Society of Economic Educators annual conference for helpful comments.

[2] Technically, there is one course, and every different variation of the course is referred to as a "section". I maintain that convention throughout.

[3] A scaffolded assignment incorporates multiple stages of instructor feedback. In the section described here students must meet with the professor to propose a topic, develop an annotated outline, submit a first draft, visit with our Writing Center after addressing instructor comments on the first draft, submit a second draft, then submit a final draft. The instructor provides feedback after each step.

an important aquacultural[4] resource. In keeping with the theme of shrimp as a food source, the fourth hour of my section incorporates cooking and tasting shrimp recipes from around the world. Students have the opportunity to develop their culinary skills and come to understand how resource availability influences recipe development. By the end of the semester, I have managed to introduce students to numerous economic ideas and tools, alongside perspectives from biology, sociology, political science, and history.

In this paper, I describe the currently existing second-year seminar at my institution. I start with a description of the required content of the second-year seminar. Second, I briefly describe the theme and trajectory of the course that I created. I then highlight four different economic ideas that I introduce during the course and demonstrate how the economic content is woven into the course content. Finally, I conclude with an assessment of the course's impact. While my institution's core curriculum is purposefully unique, elements of the course I describe can be easily used in an economics class to demonstrate principles that underlie the examples.

2. The Second-year Class

Our institution is the state's designated public liberal arts institution. This special status requires us to offer a distinctive educational experience, including a core curriculum that distinguishes it from other state institutions. As part of the distinctive core, second-year students must enroll in the GC2Y seminar. The course is not housed in a particular department, but all departments are encouraged to contribute sections to the course. Enrollment for each section is capped at 19 students, which, therefore, requires many sections to allow all (roughly 1,500) second-year students to register for one of the sections. Sections have many different themes as each faculty member who proposes a section has different areas of interest and expertise. Yet, each section must have some common components (see Appendix A for an application rubric for new GC2Y sections).

The first criterion of any proposed section to be approved as a GC2Y section is that it must expose students to multiple disciplinary perspectives. That is to say, no section can take only one approach to the subject matter. In the words of the rubric used to evaluate section proposals: *"Students will be able to explain multiple intellectual approaches that clarify or respond to problems, topics, themes, and/or issues."*

A second requirement is that a GC2Y section must have a learning-beyond-the-classroom component. Each section must incorporate a tangible, real-world application of the material being presented. To accommodate this requirement, sections count for four credit hours towards students' graduation requirements. The fourth hour of the class incorporates the outside-of-the-classroom component.

A third requirement is that each section must be writing-intensive. To ensure that students develop good writing habits and skills, each section must incorporate a scaffolded writing assignment that provides multiple stages of feedback and revision. If done properly, this will prevent students from leaning too heavily on artificial intelligence to generate their work for them. It will also provide students with insight into the writing process that they can incorporate into their future class work.

Finally, each section must have a global perspective. Again, as stated in the evaluative rubric: *"Significant portion of course covers at least 2 other cultures (parts of world) included (with comparative cross-cultural approach)."*

[4] Aquaculture refers to controlled cultivation of aquatic species such as shrimp. Aquaculture can occur in a highly controlled environment (intensive farming) or a loosely controlled environment (extensive farming).

The intent of the course is to prepare all students on campus to conduct independent research within their fields of study. For many of them, it is their first opportunity to focus on the process of building a research project from a proposal, through multiple stages of revision, to its conclusion. In this course, students work on a shrimp-related project of their own choosing. The project must incorporate documented information about how at least two different cultures interact with shrimp. The project can take many forms. Some students produce children's books that are annotated with the information a teacher might need to use the book in a classroom. Some students produce travel brochures that include information about shrimp festivals or recipes. Some students compare different countries' approaches to managing their shrimp fisheries. The process begins with each student presenting a research proposal to the instructor to ensure that each student understands the expectations of the project. The second step of the process the student must submit an annotated outline complete with citations. At this point, students review proper citation practices for different disciplines. Three drafts follow during the course of the semester. Each draft receives instructor scrutiny and feedback on ways to improve aspects of the presentation. By the end of the semester, students come to understand that there are steps to conducting research in every discipline (see Appendix B for a copy of the syllabus).

3. Why Shrimp? – Meeting the Institutional Requirements

When I developed my GC2Y section, four factors convinced me that shrimp would be an ideal subject for a second-year seminar: Shrimp are ubiquitous, they are a natural resource that is in transition from being a wild-caught resource to being a farm-raised resource, shrimp is the most consumed and most traded sea food, and the course's fourth hour provides me an opportunity to express my love for shrimp with a culinary flourish that includes the excitement of a potential culinary disaster once a week – I let the students know in advance that I am not a trained chef but I have practiced preparing all of the recipes in advance of the class.[5]

First, because shrimp are a commonly utilized natural resource found in both fresh and saltwater around the world, there are numerous opportunities to compare how different cultures integrate shrimp into their cuisines. Furthermore, because different countries face different challenges when managing their natural resources, I can demonstrate that economic models describing efficient management regimes for natural resources are dependent on the capacity of countries to afford the institutional machinery to enforce the management regime. Gillett (2008) offers an assessment of the state of shrimp fisheries for ten different countries. I use Gillett's work as one of two main texts around which I organize the section. By combining Gillett with more recent data from the CIA World Fact Book (CIA, 2024) and various publications from the Food and Agriculture Organization (FAO) of the United Nations, students get an appreciation of the state of different shrimp fisheries and the economic constraints nations face when managing natural resources.

Second, shrimp aquaculture has overtaken shrimp fishing as the main source of food shrimp globally (Akbar and Carter, 2016). This transition affords an opportunity to discuss the challenges people face when trying to feed a growing population. Different cultures have responded to this shift in idiosyncratic ways. Some try to maintain shrimp fisheries for artisanal[6] fishermen, while others try to restrict access to all but the most profitable boats. Others still focus on developing their shrimp-farming sectors, paying less attention to their shrimp fisheries.

[5] To minimize the potential for real problems, students are asked about any food allergies and sign a form acknowledging that they have been asked to provide that information. Furthermore, the instructor must pass a food safety course.

[6] An artisanal fishery is characterized by a very low capital to labor ratio and traditional methods. Typically, artisanal fishermen are subsistence anglers who rely on their catch first to feed their family, second to earn income.

The shift also highlights the advantage shrimp have over most other forms of seafood when it comes to mass production. Newman (2019) offers an excellent perspective on how people have altered their use of food resources as they progressed from hunter-gatherer social groups to agriculturally based societies. This progression has necessitated making choices about what species of plants and animals to domesticate. Food choices necessarily contract as societies specialize in food production. Her historical perspective of food extinctions provides a second organizing text for the section and frames what students see as the general shift away from wild-caught shrimp to farm-raised shrimp.

Third, shrimp is the most traded seafood internationally (Jory, 2023). This presents an opportunity to expound upon the nuances of trade policy. Additionally, because shrimp is an important international commodity, there are plenty of data sources that allow for real-world numerical examples. Within the United States, the National Oceanic and Atmospheric Administration's (NOAA) Fisheries Department monitors and publishes data concerning stock estimates and catch of multiple fish, crustacean, and mollusk species. Internationally, the Food and Agriculture Organization (FAO) of the United Nations publishes international shrimp catch figures and trade statistics. Its Globefish series (FAO Globefish, 2025) provides a wealth of statistics for both context and comparison purposes. It also offers expert assessments of management practices, aquaculture advances, and threats to shrimp fisheries. Furthermore, multiple trade group sources provide targeted insights into the shrimp trade. Consequently, students have access to reliable source materials to begin their research projects.

Finally, because the course requires a fourth hour outside of the traditional classroom lectures, I work with the students to cook shrimp dishes from ten selected countries. Not only do the recipes represent different cultures they also provide a conduit by which students can investigate other important aspects about the selected countries. In particular, I focus on recipes that highlight either an ingredient or a cooking technique that students might be unfamiliar with and offer insight into a particular country. For example, the recipe I selected from Cambodia is steamed in banana leaves, the recipe I selected from Indonesia includes shrimp paste, and the recipe I selected from Kuwait includes loomi (sun-dried lime). Students take turns assisting in the kitchen and presenting facts about the country featured in the weekly tasting session. Naturally, the cooking sessions lure students to the section. Since its inception, the section has consistently met its enrollment cap.

5. Economic Concepts[7]

While the section itself is multi-disciplinary, I highlight a quartet of economic concepts that are instrumental to a complete understanding of the evolution of shrimp as a food source. The concepts help frame the information, even when examining the historical or sociological aspects of the development of shrimp as a global food source. The economic concepts that receive devoted attention are the principles of cost-benefit analysis, the economic incentives that lead to the tragedy of the commons, the principles of natural resource management, and the principles of international trade. I am careful to introduce all these principles in a way that is both understandable and useful for a non-economics major. Because the examples are aimed at non-majors, they can also serve as introductions to the ideas as they arise in principles-level classes or more advanced coursework.

[7] For teachers who want to align lessons with the Voluntary National Content Standards in Economics (Siegfried, et al. 2010), I indicate which standards each concept covers in following footnotes.

A. Cost-Benefit Analysis[8]

The first economic idea that I infuse into the section is an introduction to the principles of cost-benefit analysis (I use Gramlich (1997) as my source material). As students learn about how wild shrimp are harvested, many of the assigned readings point out the potential detrimental impact of shrimping activities. They learn about the destruction of benthic communities,[9] by-catch issues,[10] and depletion of shrimp stocks. Similarly, as students read about shrimp farming, they discover that some farming techniques damage mangrove forests, while others aggregate pathogens. Left without any context or comparison, students may start to believe that shrimp are indefensible as a food source. This monochromatic thinking can make it hard for students to evaluate options. One cure to this myopia is to introduce the logic of cost-benefit analysis. Students can learn that, with a little disciplined analysis, they can make comparisons between different food options, which allows them to feel informed about the dietary choices they make. Fortunately, there exist many empirical ways to compare shrimp to alternative sources of protein and wild-caught shrimp to farm-raised shrimp. Over the course of the semester, I introduced three different exercises that demonstrate cost-benefit approaches.

First, multiple food researchers have analyzed the ability to turn feed into protein in domesticated animals. This provides one example where students can see the benefit of finding a common metric to compare food sources. One such presentation comes from Fry et al. (2018), who synthesize a summary of feed conversion ratios from numerous studies. The ratios they present represent the amount of food intake required to provide a unit of weight gain in various domesticated animals.

Table 1: Feed Conversion Ratio

Species	Feed Conversion Ratio
Beef	6.0 – 10.0
Pork	2.7 – 5.0
Chicken	1.7 – 2.0
Catfish	1.2 – 2.2
Tilapia	1.4 – 2.4
Shrimp	1.2 – 2.4

Source: Fry et al. (2018)

When students see that farm-raised shrimp (and most aquaculture in general) enjoy a lower feed-to-food ratio than most other farm-raised animals, they can put context to what they read about shrimp farming. While this presentation does not diminish the negative aspects of shrimp farming, it does show students that they can look for comparable information on different aspects of food production. This allows them to rationally argue that shrimp is a more sustainable food source than many other protein sources.

[8] Cost-Benefit analysis falls under Standard 2: Decision Making of the Voluntary National Content Standards in Economics (Siegried, et al. 2010).

[9] Shrimp nets that are dragged across the ocean floor may damage the habitat of bottom-dwelling species.

[10] Shrimp fisheries are notorious for catching large quantities of unintended species. Shrimp nets are indiscriminate. But technology has been developed, such as turtle excluder devices and by-catch reduction devices, that reduce unintended catches.

A second analysis we consider is a comparison of the energy cost of catching shrimp in the wild (domestically) versus raising them in ponds and shipping them from abroad. I add the assumption that we are comparing domestically wild-caught shrimp to foreign farm-raised shrimp to allow for the opportunity to quantify fuel use for transporting shrimp. Gillett (2008) summarizes the fuel used to catch shrimp as ranging from 0.16 to 2.42 kg of fuel input per kg of shrimp caught. If one wants to update Gillett's data, there are many efficiency studies to choose from. One example is Haby, Graham, & Falconer (2014). In their examination of new trawling gear, they provide a baseline for fuel use in the Gulf of Mexico shrimp fishery.

Two uses of fuel are most relevant for farmed shrimp: Transportation costs and farm energy input. Regarding transportation costs, I assume that we are shipping shrimp from Hong Kong to Long Beach, CA. The shrimp are coming on one UltraMax (a medium-sized cargo ship) laden with 7,500 twenty-foot container units, each holding 16,900 one-kilogram packages of frozen shrimp. In total, this results in roughly 57.5 thousand tonnes of shrimp being shipped at once. For comparison, in 2021, the United States. imported approximately 63,000 tonnes of shrimp. Based on efficiency estimates from Rodrigue (2024), it takes roughly 0.035 kg of fuel to ship one kg of shrimp from the Pacific Rim to the West Coast of the United States. The final piece of the comparison is the fuel use in aquaculture. Here, there is a lot of variation that depends on the intensity of the shrimp farming. Extensive approaches to shrimp farming use little external energy input but have relatively low yields. Processes that use more energy-intensive approaches yield more shrimp and impose lower environmental costs on the area where the shrimp are cultivated. For the sake of comparison, I use Boyd & McNevin (2020), who report the average energy use to aerate shrimp is 0.42 kg of energy input per kg of shrimp output.

Putting the numbers together, students see that the estimated use of energy for farming shrimp and shipping them across the Pacific Ocean falls right in the middle of the estimated range for the different approaches to catching shrimp in the wild. It is useful for students to see that, while informative, cost-benefit analysis does not always provide a clear winner. More importantly, students see that a rational approach to making comparisons is available.

Finally, students hear from chefs about the taste advantages wild-caught shrimp have compared to farm-raised shrimp (Chang, 2018). However, students know that famous chefs have spent their lives developing their sense of taste. Therefore, I test their palettes with one of the cooking exercises to see if the students can distinguish between farm-raised shrimp and wild-caught shrimp. The success rate is about on par with random guessing. However, when I point out the price difference at the local chain grocery store, most agree that they would be unwilling to spend the extra money to buy the wild-caught shrimp on a regular basis. This experiment has the added advantage of driving home the notion of opportunity cost within their shopping choices. The trained chef may be willing to pay the price difference to cook with the finest ingredients. Students on a budget do not find the taste difference worth the additional cost.

Because cost-benefit analysis at its best is an application of the equimarginal principle, these examples could be used in a first-year course. Or, if one wanted to present a more detailed example, these could be used in a public finance course to demonstrate how data informs policy.

B. Tragedy of the Commons[11]

One of the inevitable economic lessons of discussing shrimp from an economic perspective

[11] The tragedy of the commons falls under Standard 16: Role of Government and Market Failure the Voluntary National Content Standards in Economics (Siegried, et al. 2010).

is Garret Hardin's "tragedy of the commons" (1968). Gillett's (2008) summary of ten of the world's shrimp fisheries returns again and again to the theme of overfishing and overcapitalization.[12] Naturally, from the student's perspective, overfishing appears to be a simple problem to solve. One of the many benefits of starting with Gillett's (2008) study is that he offers insight into the problems various countries face when attempting to impose regulations to curb overfishing. The international comparison is quite compelling. Countries can be lumped into essentially four categories: wealthy with an interest in sustainable shrimp harvests; wealthy with little interest in sustainable shrimp harvests; developing with an interest in sustainable shrimp harvests; and developing with little interest or ability to monitor sustainable shrimp harvests. Each category presents interesting contrasts. Australia, as an example of the first category, pursues a textbook regulatory regime that manages entry into the commons like a monopolist. Kuwait exemplifies the second category by relegating almost its entire shrimp harvest to foreigners working its shrimping fleet. Madagascar, although developing, values its shrimp exports to the extent that, despite limited resources, it has been managing its western waters with an eye to gaining international eco-certification from the Marine Stewardship Council (World Wildlife Foundation, 2015). Finally, Cambodia, also developing, lacks the resources to prevent richer neighboring nations from impinging on its fishing grounds, nor does it have the wherewithal or inclination to prevent artisanal and subsistence fishermen from exploiting its stocks. Gillett (2008) describes how Cambodia's attempts to restrict fishing in shallow waters mainly impact artisanal and subsistence fishermen and have led to political resistance.

I introduce students to a graphical depiction of the incentives that lead to overfishing in a common. I start by explaining that we will be working in two dimensions: fishing effort on the X-axis and dollars (costs and benefits) on the Y-axis. I start with the premise that the price of shrimp is known and constant, so that we are working with a horizontal marginal benefit (revenue) curve. I then introduce an increasing marginal cost curve. Implicit (made explicit in the next section) is that as effort increases, so does the additional cost of additional effort – hence the upward sloping marginal cost curve. Fishermen must work their way further from their launch point at the individual level and at the industry level; additional effort depletes stocks and increases the cost of finding more shrimp. From there, it is easy to describe the point where the additional cost of catching shrimp equals the additional benefits of catching shrimp. Then we can examine both sides of the equality to see why, in the framework being presented, the point at which the marginal cost of catching shrimp equals the marginal benefit of catching shrimp represents an optimal level of effort for the industry. I follow by introducing the average cost of catching shrimp. By the premise of an increasing marginal cost function, the average cost function is increasing, but everywhere below the marginal cost curve. This allows for an introduction of the reality that profitable shrimpers attract additional shrimpers. When teaching competitive markets, profit is the signal for entry, which drives the price to the long-run minimum average total cost. But it is also the driver behind the over-exploitation of a common resource. The incentive for new fishermen to enter the shrimp fishery continues until the average cost function intersects the marginal benefit function (which is also the average benefit function due to its constancy) and all rents are dissipated. This happens because individual fishermen do not recognize that their catch imposes costs on all other fishermen by decreasing the amount of shrimp available in the fishery. The upshot of the tragedy of the commons is that the same market forces that provide low prices in a competitive market can lead to the depletion of natural resources, which harms both producers and consumers. This allows for a discussion of the difference between a competitive solution in a shrimp fishery where anyone can enter the fishery and a monopolized solution where entry is strictly controlled (i.e., the state acts as the

[12] The two problems are intertwined. When shrimp became a profitable international commodity, many countries allowed a rapid expansion of number of commercial fishing vessels allowed to fish in their waters. This led to fishing levels that exceeded the ability of shrimp to reproduce fast enough to replace their numbers.

sole owner of the resource and limits entry to maximize the net benefits of the fishery). From there, we can work through different ways to either regulate the fishery to achieve a more desirable outcome (increase costs by mandating less efficient gear, require the retention of by-catch as two examples) or use a property right approach such as tradable quotas to allocate the resource. With the readings in Gillett (2008), students can see the limitations of the economic model, as it neglects the resource constraints countries face.

The introduction of the tragedy of the commons sometimes occurs at the end of a principles of microeconomics course. More often, it is introduced in an environmental economics course. The example presented here allows for a critical examination of the typical environmental economics model.

After presenting the tragedy of the commons model, I point out that I have not yet addressed the biology of shrimp as a renewable resource. One of the benefits of the multidisciplinary design required of the course is that it provides a natural opportunity to show how two seemingly disparate disciplines – economics and marine biology – can inform each other and better explain the world.

C. Natural Resource Management – Fisheries Model[13]

Upon completion of the tragedy of the commons presentation, it is time to highlight another of its shortcomings. As presented, the costs and benefits are limited to economic considerations. The model is greatly enhanced by adding a biological component. The Gordon-Schaefer (Gordon, 1954) fisheries model introduces the constraints of biological reproduction and biome carrying capacity into the economic exploitation of fisheries. The importance of the Gordon-Schaefer model is that it considers the fish stock available and informs policies about the impact of catch rates on the sustainability of the stocks. Recruitment[14] rates differ with different fish stocks. And catch rates that deviate from recruitment rates will either allow the stocks to improve over time if they are less than the recruitment rates, or will deplete the stock over time if they exceed the recruitment rates. I use Kitchel et al. (1974) to highlight some of the factors that impact biomass recruitment. This allows students to see two things. First, there is a scientific understanding behind various regulations aimed at rebuilding depleted fish stocks. The economic analysis benefits from a full integration of the biological information to improve policy recommendations. Second, factors other than fishing pressure must be accounted for, and can be possible avenues to either rebuild or maintain stocks.

While the Gordon-Schaefer model provides a compelling pathway to conserving wild shrimp stocks, Greenberg (2011) considers the difficulty of translating textbook conservation practices into real-world success stories. He offers an account of attempts to preserve existing Pacific salmon stock while balancing the needs of indigenous people's claims on the resource. His assessment closely parallels the experience of many countries that attempt to manage their shrimp stocks while allowing artisanal fishermen to continue their subsistence practices.

The Gordon-Schaefer model is an advanced resource management model. The intuition of the model is appropriate for an undergraduate environmental economics course. A full presentation of the model requires calculus and is more appropriate for an advanced environmental economics course.

[13] The Fisheries Model falls under both Standard 1: Scarcity and Standard 16 Role of Government and Market Failure of the Voluntary National Content Standards in Economics (Siegried, et al. 2010).

[14] Recruitment refers to the net change in fish stock over time. Fish stock is generally measured in overall biomass or weight rather than numbers of individual fish or shrimp in the fishery.

D. International Trade – Impact of Tariffs and Quotas[15]

A fourth economic model that naturally complements a discussion of shrimp is a presentation of the basic treatment of international trade. One fact about shrimp that surprises some is that Americans import roughly 90% of all the shrimp they consume. But coastal communities, particularly in the Gulf of Mexico and the Southeastern United States, still have active shrimp industries. Consumers in these communities are urged to buy American-caught shrimp. The sheer magnitude of shrimp imports provides an opportunity to introduce students to how economists approach questions of trade.

The lesson itself is simple: start with a domestic increasing-cost industry of fishermen who catch wild shrimp, a downward sloping demand curve, and an international price of shrimp. Because there is plenty of data available, it is possible to make the basic trade model adhere as closely to real-world data as one likes. I rely on three data sources to set up the example. International Monetary Fund historic shrimp prices are available on the St. Louis Federal Reserve Bank's FRED site,[16] historic U.S. shrimp landings can be found on the NOAA Fisheries site,[17] and historic U.S. shrimp imports can be found on the USDA website.[18] I start the example assuming a world before trade. I choose an equilibrium price of $20.00 a pound in the U.S. and an equilibrium quantity of 300 million pounds (roughly equal to peak U.S. shrimp landings). I then introduce a perfectly elastic world supply of shrimp set at a world price of $10.00 per pound – roughly the price of a pound of frozen shrimp in a grocery store today. Because I have already introduced the concepts of consumer and producer surplus, students can readily compare the well-being of shrimp consumers pre-trade to post-trade. They can also see that some U.S. shrimpers will not be able to compete at the global price of shrimp. In the data, one can see U.S. landings have fallen by roughly one-third of their peak landings. One can also see imports of shrimp dwarfing U.S. landings by 2020.

Because it is evident that, while consumers in the United States benefited from increased shrimp trade from the 1950s until the present, U.S.-based shrimp fishermen shouldered the burden of falling shrimp prices, we can turn to evaluating restrictions on trade.

First, we examine the impact of a $5.00 per pound tariff on imports of shrimp. We start by showing the impact on domestic consumers. Consumer surplus falls. Domestic suppliers of wild-caught shrimp benefit. The domestic quantity supplied increases as the higher price of shrimp encourages more people to enter the industry and increase producer surplus. However, even when we account for the tariff revenue raised (paid by domestic shrimp consumers due to the perfectly elastic world supply of shrimp), we see that the overall impact of the tariff is negative.

More common in the shrimp industry, however, are non-tariff barriers to entry. Two topics previously covered in the course are relevant to this point. First, when describing the history of modern shrimp fishing, I introduce both turtle excluder technology and by-catch reduction technology. The United States restricts imports from any nation that fishes in waters inhabited by sea turtles that do not require the use of turtle excluder devices. With that knowledge, students are able to reflect on the opportunity cost of upholding the values of the Endangered Species Act when we choose what we import. Second, when I review the history of shrimp farming, we discuss the problems of keeping a large number of shrimp confined in close proximity healthy.

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[15] International Trade falls under Standard 5: Trade of the Voluntary National Content Standards in Economics (Siegried, et al. 2010).

[16] https://fred.stlouisfed.org/series/PSHRIUSDM (International Monetary Fund).

[17] https://www.fisheries.noaa.gov/foss/f?p=215:200 (NOAA).

[18] https://www.ers.usda.gov/data-products/aquaculture-data/aquaculture-data/ (USDA).

Many countries do not closely regulate the use of antibiotics in shrimp aquaculture. The United States places restrictions on allowable antibiotic residuals in imported shrimp (for a summary of banned imports due to antibiotic residuals, see Southern Shrimp Alliance, 2025). Again, when we have goals as a society beyond just minimizing the cost of providing food, perhaps we want to protect turtles, or we want to ensure our food meets production standards – we must pay for achieving those goals. The simplicity of the trade model makes the opportunity cost of any trade restrictions clear, providing insights that extend far beyond the price of shrimp. Because the model is a direct application of the trade model presented in most principles of economics textbooks, it can be used in any introductory class.

5. Concluding comments

While the opportunity to offer a section such as the one described herein is rare, the lessons I have developed can be used by anyone seeking classroom exercises on the economic concepts I cover. I take advantage of focusing on one commodity to explore applications of economic reasoning. First, I provide three examples of how cost-benefit reasoning can illuminate real-world decision-making. In a principles class, this can be a lead-in to marginal analysis or applications of economic reasoning to policy-making. Second, I introduce the economics behind the tragedy of the commons. Open-access resources present an example of goods that do not obey the simple competitive market model. Whether an instructor is teaching an environmental economics class or looking for a brief example that highlights the shortcomings of the competitive market model, the management of shrimp provides a compelling example of both good management regimes and poor management regimes. Third, when I segue from the tragedy of the commons to a description of resource management models, I provide an example that stresses the importance of including information from other disciplines (notably the inclusion of biological models of carrying capacity and stock recruitment) to illuminate economic models. This serves as a general reminder to students at any level that the economic models work within a broader context. Finally, I present an application of the familiar trade model that is made more compelling with the observable impact trade policies have on a common commodity.

I recognize that the opportunity my institution has afforded its faculty is rare. But in its rarity comes a chance to develop materials that might not otherwise come into being. I hope that other instructors will find them useful.

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Appendix A: Course Proposal Rubric

Section Proposal Rubric Checklist ~ GC2Y

Checklist for Proposals	NOTES	Does not meet requirements	Meets requirements	Exceeds requirements
Course outcomes align to area outcome: "*Students will be able to explain multiple intellectual approaches that clarify or respond to problems, topics, themes, and/or issues*"				
Outcomes are assessable: *Stated as clearly observable, measurable, actionable, and quantifiable*				
Learning Beyond the Classroom: *Includes descriptions of well-structured LBTC components offering students opportunity to participate in significant and well-integrated activities & experiences*				
Syllabus: *Syllabus included in proposal packet contains essential elements (readings, rough weekly schedule, written work, grading criteria, outcomes)*				
Writing Intensive: *Writing-Intensive means using writing as an important—if not most important—type of course assessment. Expectations of writing-intensive assignments go beyond weekly short essays (although they could be a part of the overall writing requirement) and typically involve longer papers (minimum of 3000-words) and evidence of scaffolding.* *"Scaffolding" refers to developmental opportunities for students to revise papers based on feedback from the instructor and/or peers & a framework for analyzing ideas in written form as course progresses.*				
Global Perspectives: *Significant portion of course covers at least 2 other cultures (parts of world) included (with comparative cross-cultural approach)*				

The 4th hour: *15 additional hours scheduled and planned in advance (to be listed on PAWS) in any reasonable configuration*				
Contributes to a distinctive liberal arts core: *Clear alignment with Georgia College Mission & Value Statements*				

Revised 11/30/2020

Appendix B: Abbreviated Syllabus

GC2Y: Shrimp: Economic, Environmental, and Cultural Implications of Food Choice

Syllabus and Reading List

Basics of a GC2Y Section:

All GC2Y sections at Georgia College are designed to develop important skills that will help you as you continue your progression toward your degree in your chosen field. First, GC2Y sections help you use multiple intellectual approaches to examine a particular issue. Second, GC2Y sections have a global perspective. Third, GC2Y sections are research and writing-intensive, meaning you will have opportunities to get feedback and to rework research and writing assignments. Finally, every GC2Y section has an outside-of-the-classroom component so that you can apply what you learn to the "real" world. In this section, we will use elements of anthropology, biology, economics, and culinary arts to examine aspects of food choices. In particular, we will use the global evolution of shrimp as a food resource as the topic to which we will apply the various approaches. The outside-of-the-classroom component will be cooking and tasting shrimp recipes from around the world. The section will provide you with multiple opportunities to research aspects of the global shrimp industry and will culminate in a written project that will require multiple drafts.

Please note: If you have seafood allergies or any dietary restrictions that prohibit you from eating shrimp, this may not be the GC2Y section for you.

Course Objective:

The objective of this course is to help you develop your analytical skills, your writing skills, and your ability to combine ideas from multiple disciplines to inform your life choices. Specifically, this section will examine shrimp as a food source to provide you with a systematic framework within which you will be able to rationally consider the ramifications of your food choices. This section will introduce multiple types of shrimp and how they benefit people. This section will place food choices – cuisines – in cultural contexts. The section will introduce you to various models used to examine fisheries and trade, quantify benefits and costs, and address the overuse of open-access resources.

By placing an emphasis on the wide variety of cultural perspectives, you will see that managing food sources requires a multidisciplinary approach. One way to highlight the similarities and differences between cultural perspectives will be through the cuisines of various regions. Therefore, this section will offer an opportunity to taste shrimp recipes that originate from different parts of the world.

Learning Outcomes:

You will demonstrate your ability to synthesize information from multiple sources using an integration of disciplinary approaches to address the complexities of food sourcing. You will deliver oral reports and written assignments that highlight the specifics of the global market for shrimp and the cultural aspects of the global market for shrimp. Throughout the semester, you will be assessed on your ability to marshal research materials and improve your work based on the feedback you receive. You will apply your abilities to discussions about some of the recipes you will taste.

Required Readings:

Main Books (required):

Newman, L. (2019). Lost Feast: Culinary Extinction and the Future of Food. ECW Press. Toronto, Ontario, Canada. ISBN 978-1-77041-435-8 (available on Amazon: $12.99 Kindle, $15.27 Hardback)

Gillett, R. (2008). Global Study of Shrimp Fisheries. Food and Agriculture Organization of the United Nations (FAO). Rome. (PDF freely available online: http://www.fao.org/3/i0300e/i0300e00.htm or on the class GaView page)

Other Required Readings (mostly freely available on the class GAView page or online):

Almerico, G. M. (2014). Food and Identity: Food studies, cultural, and personal identity. Journal of International Business and Cultural Studies v. 8 pp. 1-7. (Available online via Galileo)

Crowther, G. (2013). Eating Culture: An Anthropological Guide to Food. Chapter 5. University Press. Toronto, Ontario, Canada. (Available online via Galileo)

Gordon, H. S. (1954). The Economic Theory of Common-Property Resource: Fishery. Journal of Political Economy 62:2 pp. 124 – 142. (Available online via Galileo)

Greenberg, P. (2010). Salmon: Selection of a King (chapter 1) in Four Fish: The Future of the Last Wild Food. On Reserve in Library)

Hardin, G. (1968). The Tragedy of the Commons. Science 162:3859 pp. 1243-1248. (Available online via Galileo)

Other Media:

Netflix: Ugly Delicious Season 1, Episode 4: Shrimp & Crawfish (the rest of the episodes are excellent as well)

Graded Assignments (see rubrics at the end of the syllabus):

Introduce your shrimp: 5-10-minute presentation of a particular shrimp with a 2-3-page paper – 20 points (Weeks 3-4)

Recipe Deconstruction: Deconstruct 4 recipes presented during the semester – 5 points each (20 points total) (Throughout the Semester)

Country/Cooking Help: Assist in recipe presentations (10 points)

Scaffolded Writing Assignment (see description):

Proposal – 10 points (Week 2)
Outline – 20 points (Week 4)
First draft – 20 points (Week 7)
Second draft – 20 points (Week 11)
Penultimate draft – 20 points (Week 14)
Final draft – 10 points (Week 16)

(100 points total)

Midterm: 15 points (Week 8)

Final: 35 points (Finals period)

Point total: 200
A 180 – 200 points
B 160 – 179 points
C 140 – 159 points
D 120 – 139 points

Course Outline:

Part 1: What are Shrimp? Newman chapters 1-3, Gillett pages iii-xxiii, 1-32, 81-87, 155-190 (Australia and Cambodia)

Weeks 1 and 2: Meet the Shrimp: Penaeids, Carideans, and Sergestids.

Course introduction, Research skills presentation

Weeks 3 and 4: Food and Culture

Reading: Almerico (2014)

"Meet My Shrimp" project presentations

Part 2: Shrimp Recipes and What They Tell Us: Newman chapters 4-7, Gillett pages 191-234 (Indonesia, Kuwait, and Madagascar)

Weeks 5 and 6: Cooking Shrimp: The vocabulary of the kitchen

Reading: Crowther (2013)

Part 3: Tools for Decision Making: Newman chapters 8-10, Gillett pages 33-36, 69-80, 125-133

Weeks 7 – 9: Benefit-Cost Analysis as a Tool for Comparison

Midterm

Part 4: Sustainability and Regulation: Newman chapters 11-13, Gillett pages 37-68, 89-124, 133-152

Week 10: Free Range Shrimp – Fishing Practices and Costs

Reading: Greenberg (2010), Gillett 235-271 (Mexico, Nigeria, and Norway)

Week 11: Tragedy of the Commons – Overfishing

Reading: Hardin (1968)

Week 12: Schaefer Fisheries Model -- Sustainability

"Optimal Harvest" – Economic Return and Sustainability

By Catch

Habitat Disruption

Reading: Gordon (1954)

Weeks 13-14: Alternatives to Free-Range Shrimp: Aquiculture's Promises and Limitations

Reading Gillett 273-312 (Trinidad & Tobago and The United States)

Weeks 15 – 16: Trade: Economic Promise, Winners, Losers

Descriptions of Written Assignments (Full Rubrics for each assignment available on the course GAView page)

Shrimp Research Opportunity #1 – Meet A Shrimp

Students in groups of two will prepare and present brief summaries of a selected species of shrimp. The write-up for each presentation should be 2-3 pages in length. The presentation should be 10 to 15 minutes. Each presentation will answer the following questions:

1. Where can this shrimp be found?
2. How plentiful is it?
3. What is unique about this shrimp?
4. What is this shrimp's biological niche?
5. Is this shrimp of economic significance? If so, what is it?

I will assign the topic shrimp by random lottery.

Shrimp Research Opportunity #2 – Recipe Deconstruction

Break a recipe down into its components (ingredients) and analyze the role each component plays in the recipe.

You are to deconstruct four recipes, at least three of which will be among the recipes presented on Fridays this semester.

5 points each

20 points total

For the given recipe:

1) List the ingredients of the recipe.

2) Identify the country of origin for the recipe.

3) Identify which ingredients are indicative of the country of origin or techniques that are distinctive to the country of origin.

4) Identify the shrimp that is most likely used in the original version of the recipe. Provide evidence for your choice.

Shrimp Research Opportunity #3 – Scaffolded Writing Project

This is a scaffolding writing project. Students will work on their writing skills by planning, researching, writing rough drafts, getting feedback, and improving their project throughout the course of the semester.

Options (these are just suggestions. I will consider other options):

One-act Play

Short story

Policy memo

Children's book

Original (not one found in recipe books) recipe

Elements:

3,000 to 3,500 words

Minimum of five citations from primary sources (Wikipedia and other aggregator websites are not primary sources).

Culturally relevant – the project must accurately feature elements related to a specific (non-US) culture

Highlight a specific shrimp family or genus

Economic/environmental aspect – importance to the story

Process:

This project will be broken down into multiple stages to help the student focus on each step of a research project. The first step will be to propose a project. You must convince me that the project is doable and worth doing. The second step is to construct an outline with source material. This is to help you organize your thoughts and develop research skills. The third step is constructing a rough draft. This step helps you work on the pacing of your research project. The remaining steps are updated versions of the project. These steps will help you see that it is valuable to go over your project before considering it to be complete.

Note: The use of AI-generated papers or representing the work of others as your own work is considered academic dishonesty and will be punished accordingly. Please familiarize yourself with the academic policies concerning academic dishonesty.

Project is worth 100 points total. It is in steps, which are:

Proposal (in person)
Outline
Rough draft
First revision (Writing Center visit)
Second revision (penultimate version)
Final version

You cannot skip steps!